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Miyachika et al.

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(54) **METHOD FOR PRODUCING PRESSURE-SENSITIVE ADHESIVE TAPE PACKAGE**

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CPC ***B32B 37/26*** (2013.01); ***A61F 13/0008*** (2013.01); ***A61F 13/0276*** (2013.01);
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None
See application file for complete search history.

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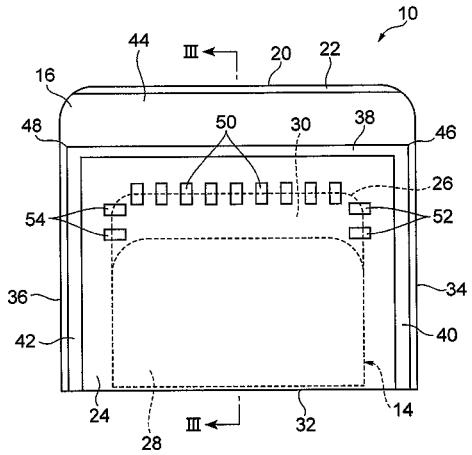
(57) **ABSTRACT**

An object of the present invention is to provide a method for producing a pressure-sensitive adhesive tape package suitable for mass production. The production method according to the present invention aims at producing a pressure-sensitive adhesive tape package which is a pressure-sensitive adhesive tape package **10** accommodating a pressure-sensitive adhesive tape **14** having a support **18** and an adhesive agent layer **12** provided on one surface of the support **18**, the pressure-sensitive adhesive tape package comprising a release sheet **16** to which the adhesive agent layer of the adhesive tape is releasably attached. In this method, the adhesive tape **14** is bonded to the release sheet base material **116**, and folded in two. Subsequently, a plurality of adhesive tapes **14** is heat sealed and temporarily attached to one release sheet base material **116**, and the release sheet base material **116** is cut.

12 Claims, 16 Drawing Sheets



(51) **Int. Cl.**

B32B 38/00	(2006.01)
A61F 13/00	(2006.01)
C09J 7/02	(2006.01)

(52) **U.S. Cl.**

CPC ***A61F13/0279*** (2013.01); ***B32B 38/0004*** (2013.01); ***C09J 7/0207*** (2013.01); *B32B 2037/268* (2013.01); *Y10T 156/1015* (2015.01); *Y10T 156/1036* (2015.01)

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Fig.1

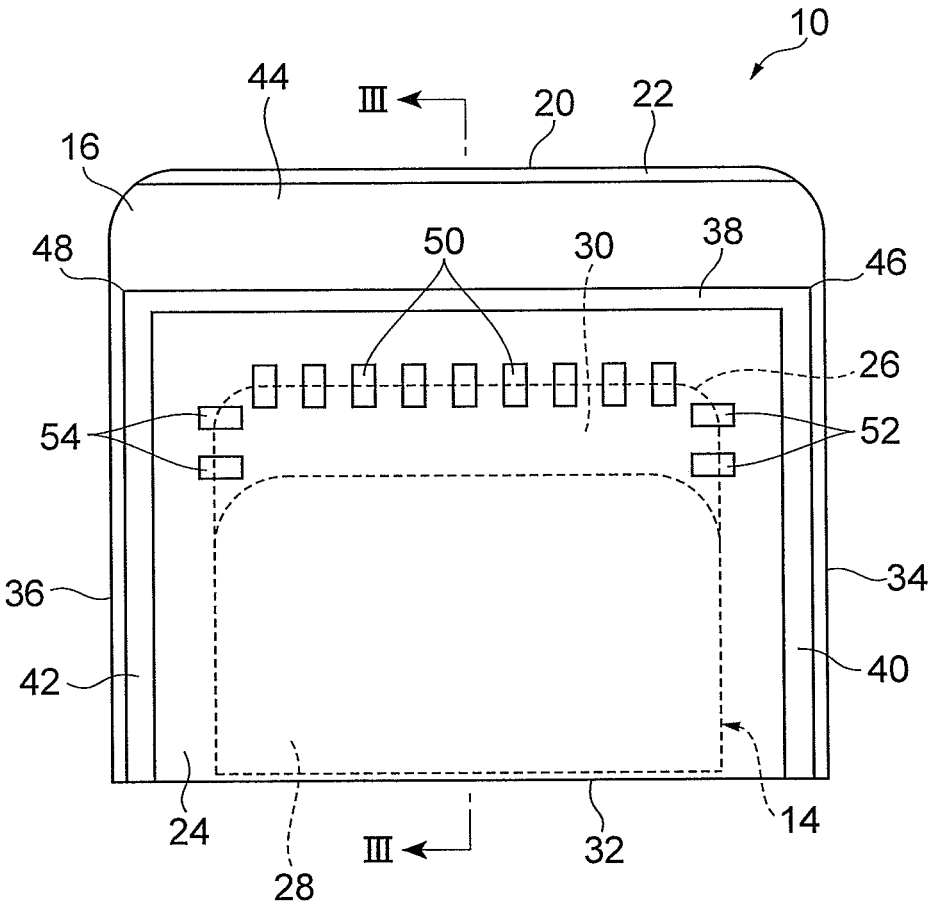
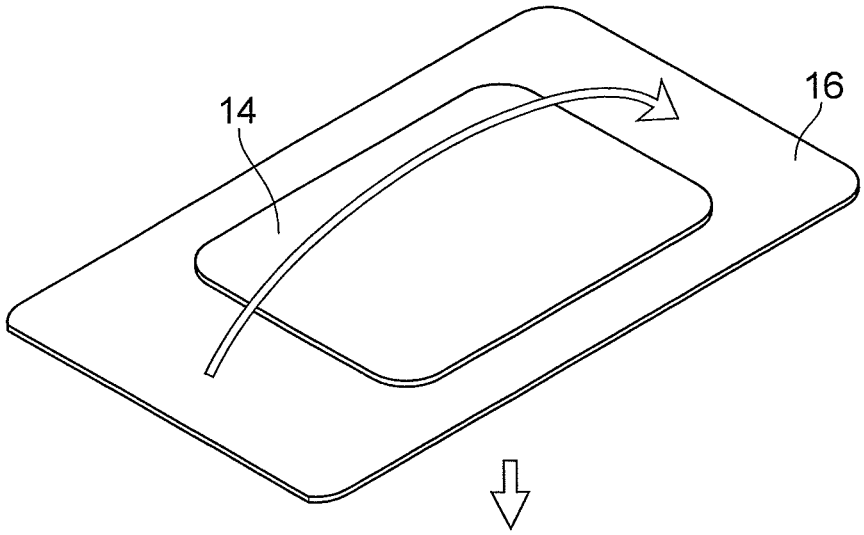


Fig.2

(a)



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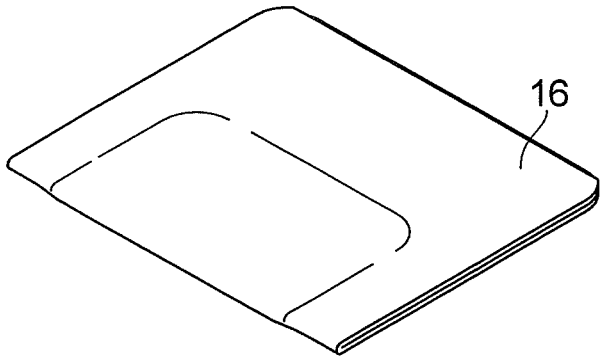

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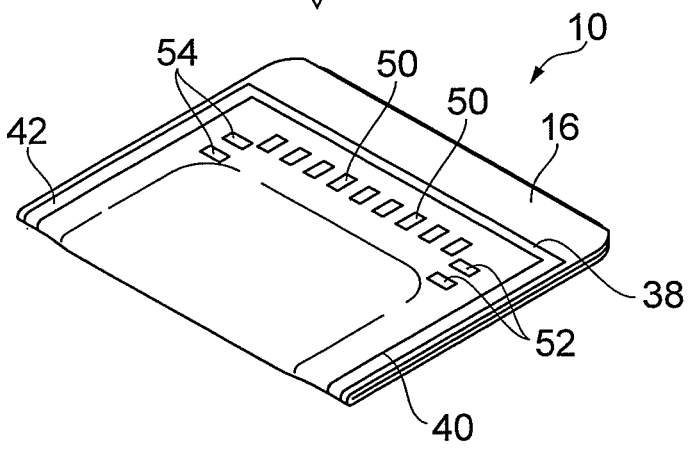


Fig.3

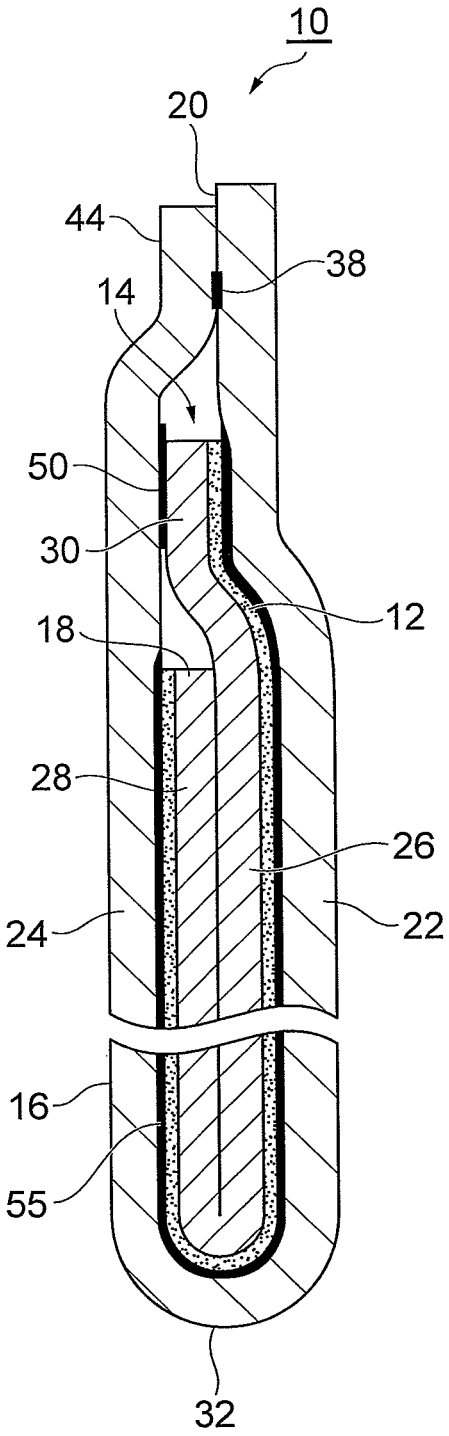
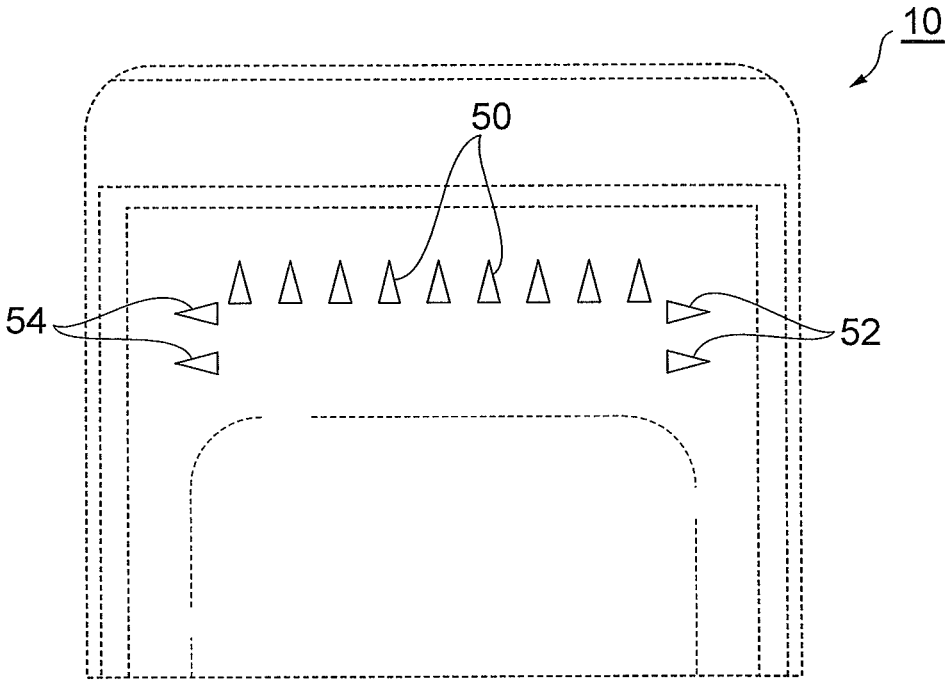


Fig.4

(a)



(b)

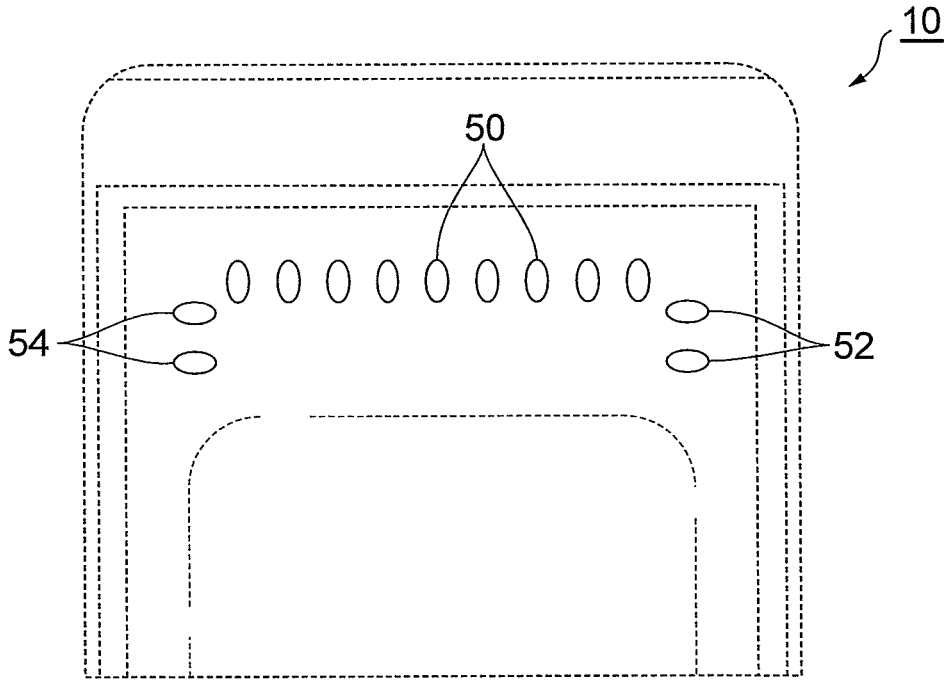
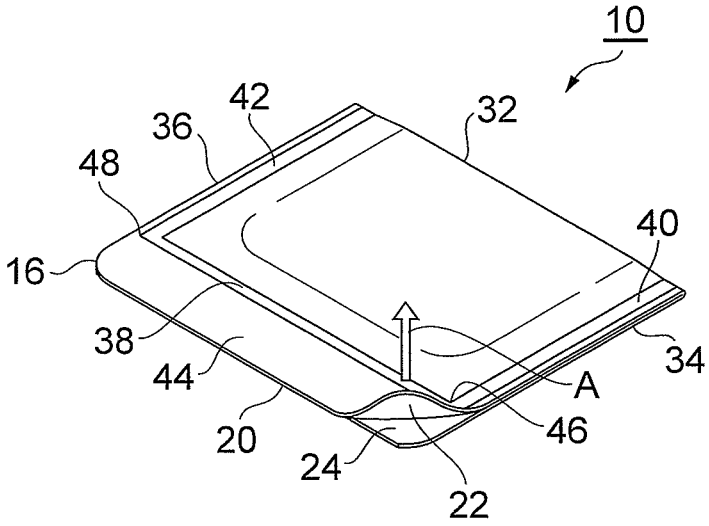


Fig.5

(a)



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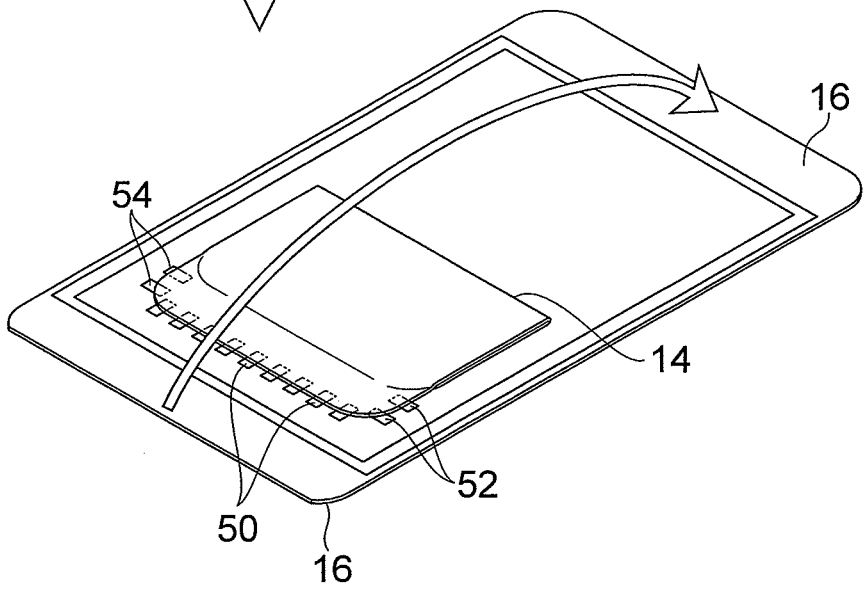

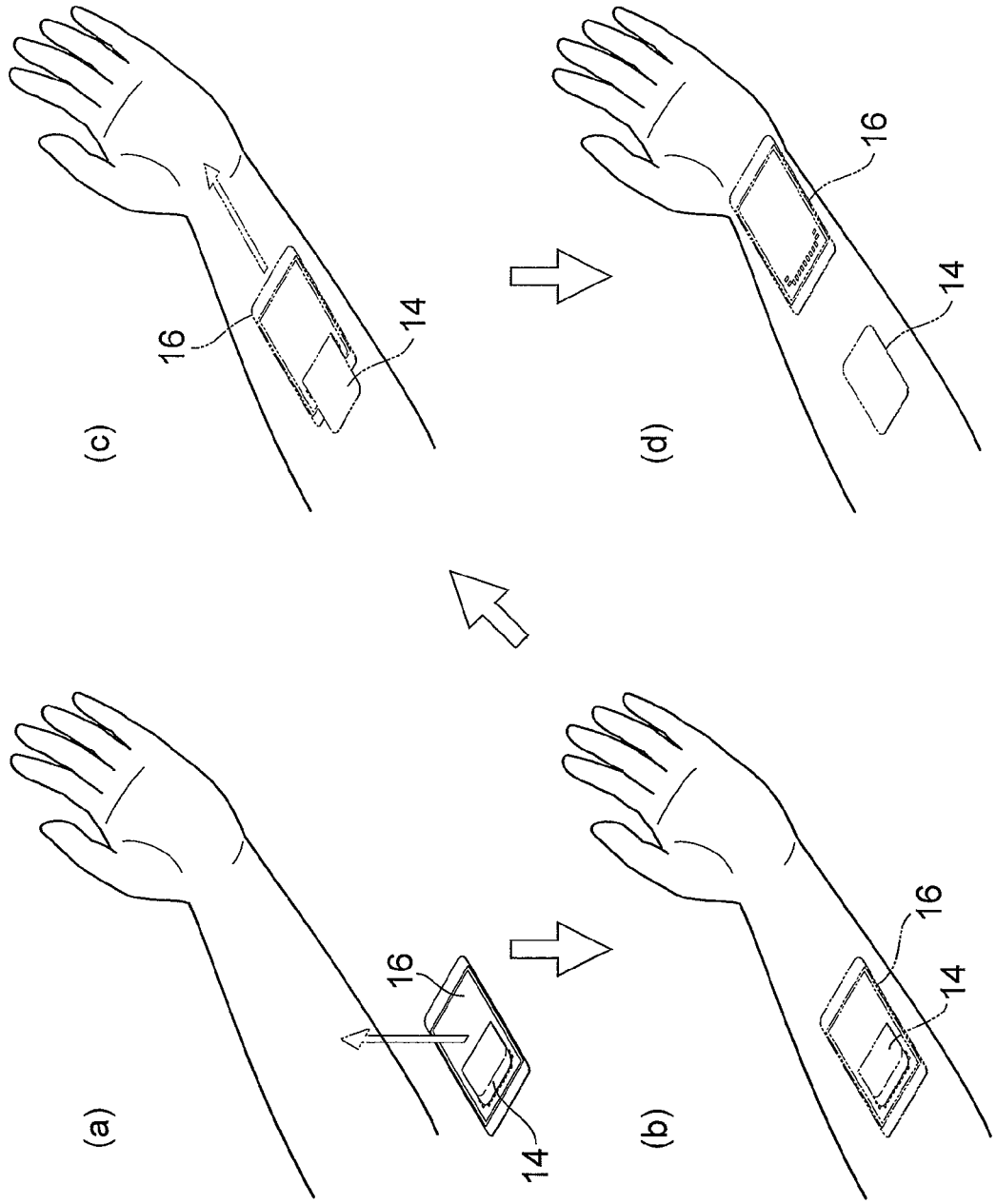

Fig.6

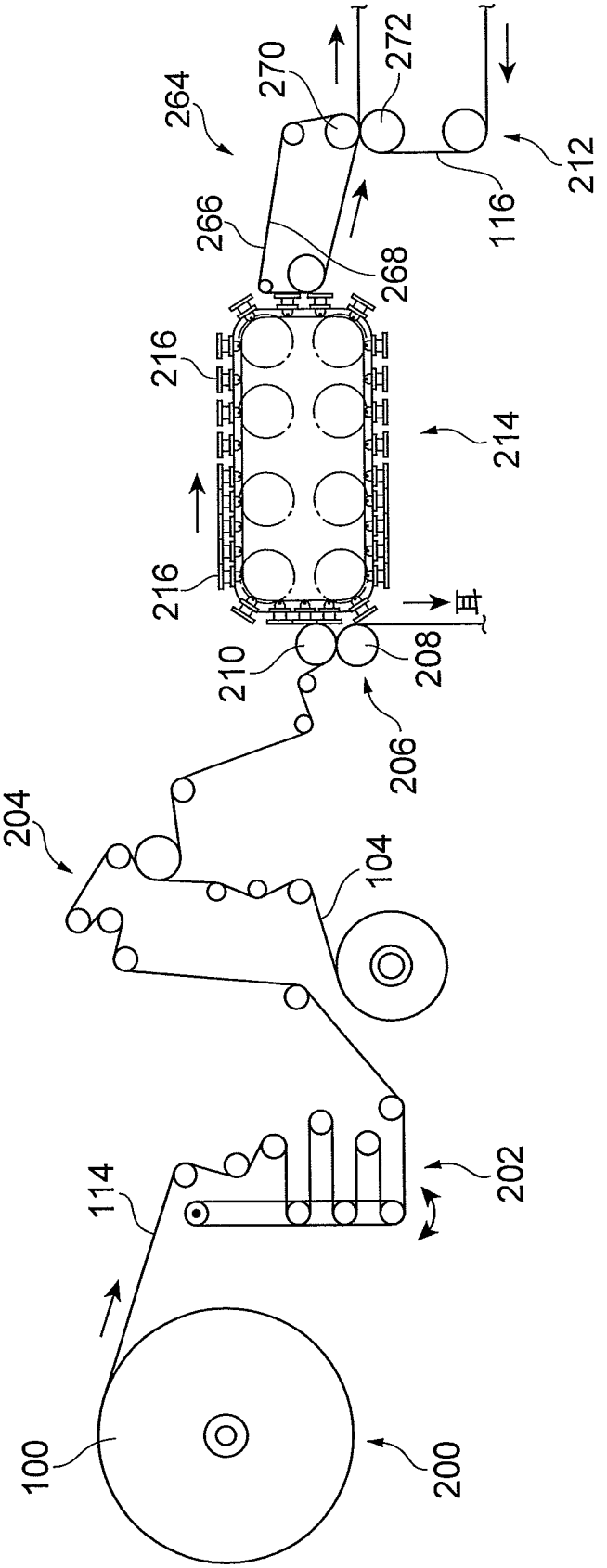
264
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Fig.7

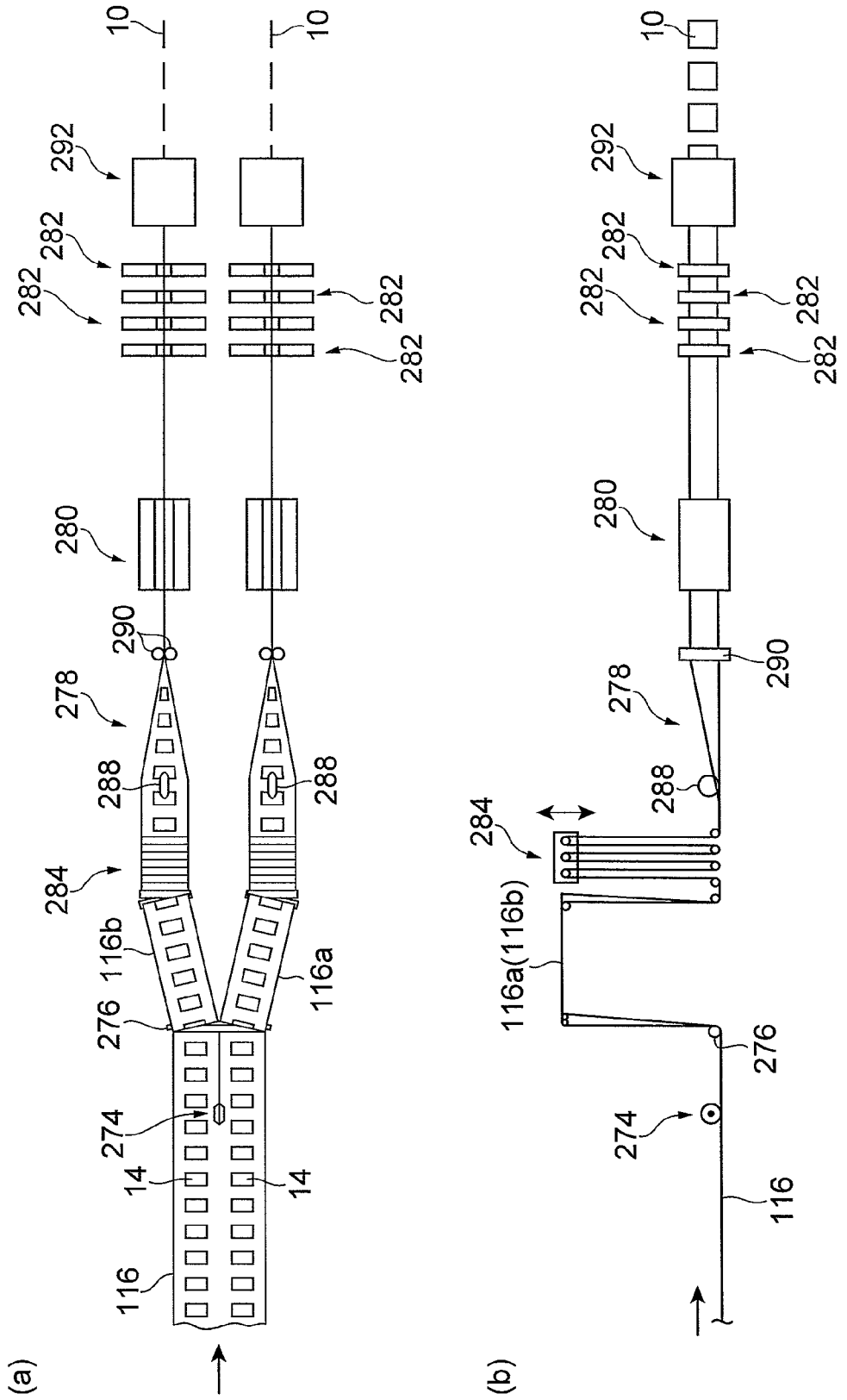
(a)
(b)
10
292
282
280
290
278
288
284
116b
116a
276
274
14
116
116a(116b)

Fig.8

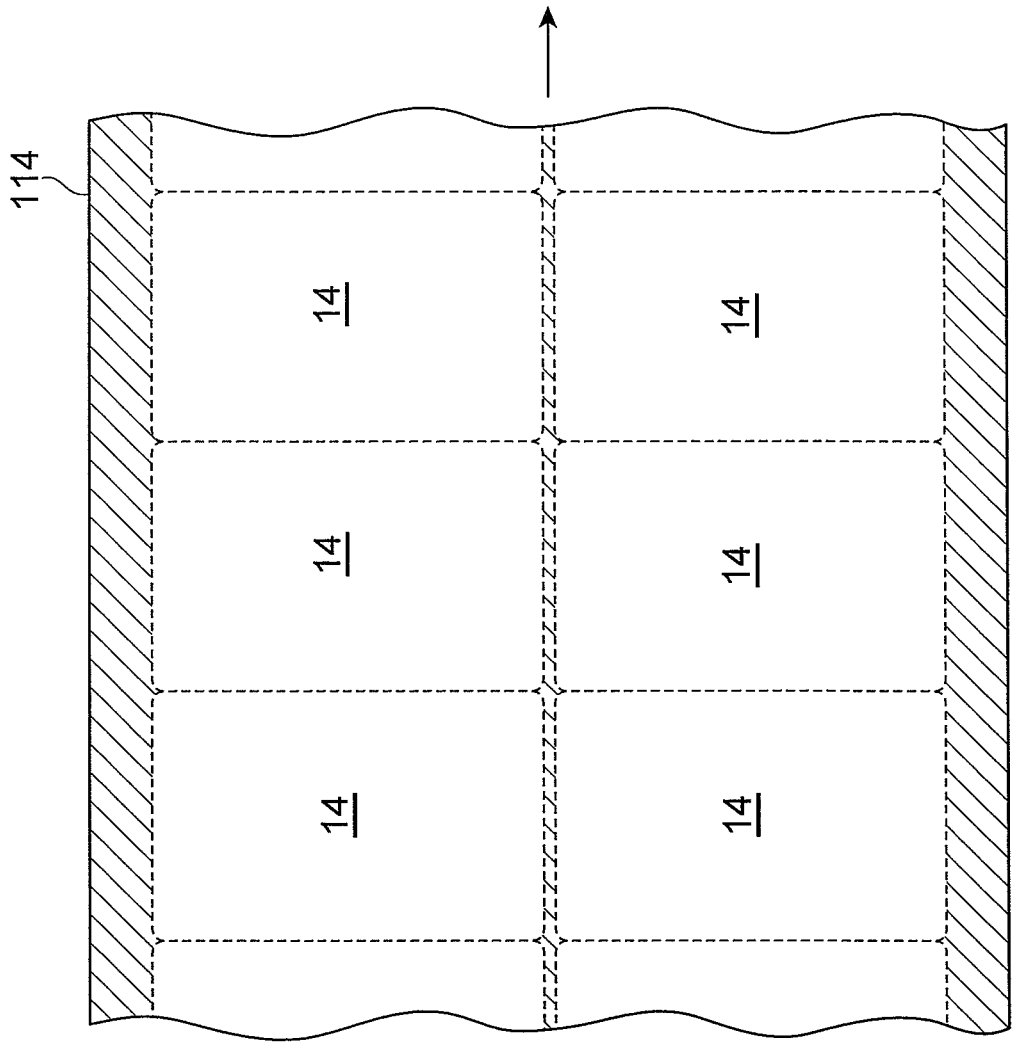

Fig.9

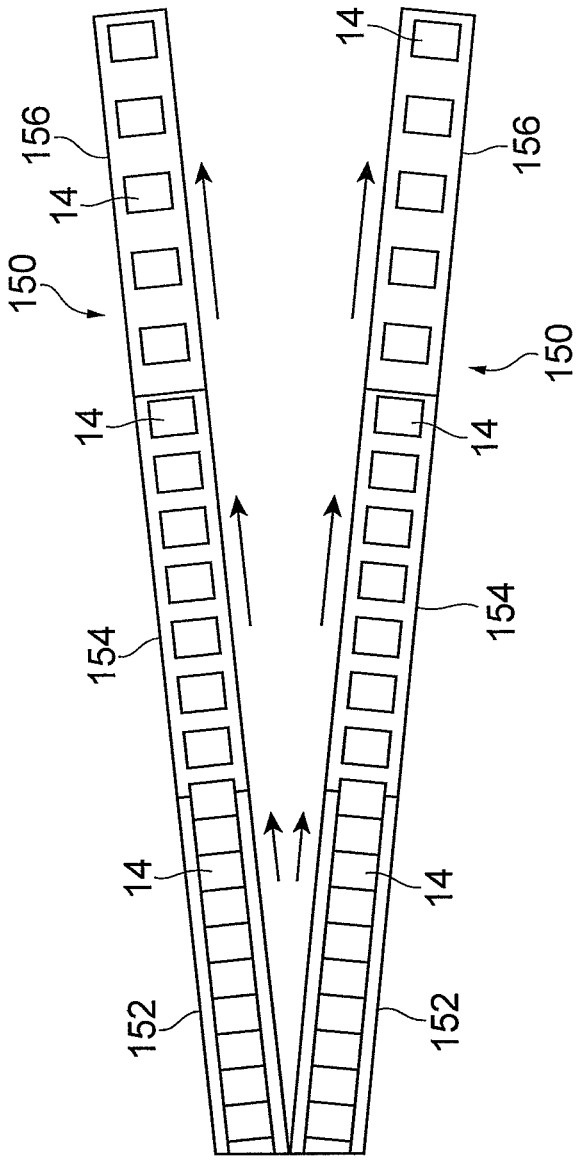

Fig.10

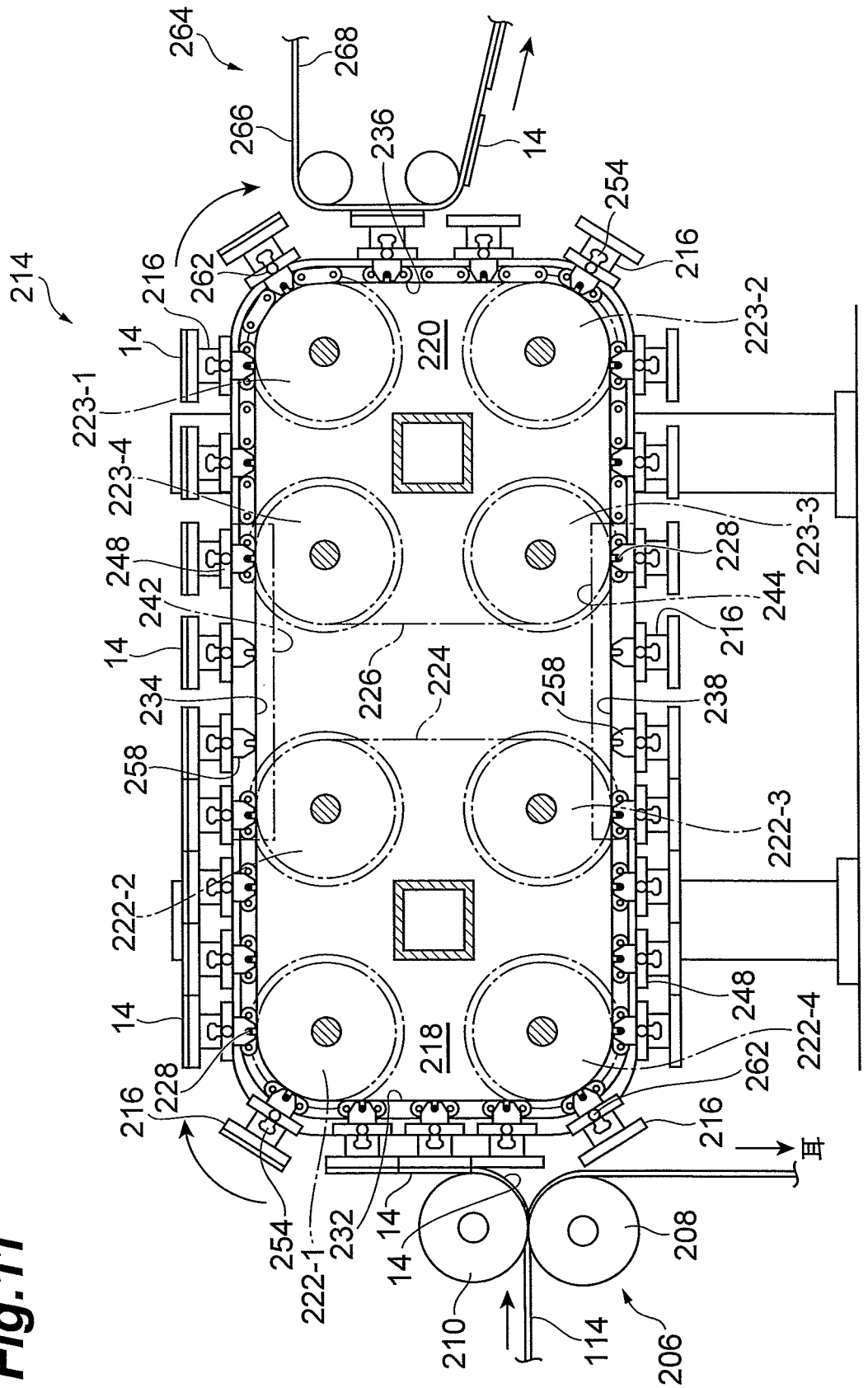
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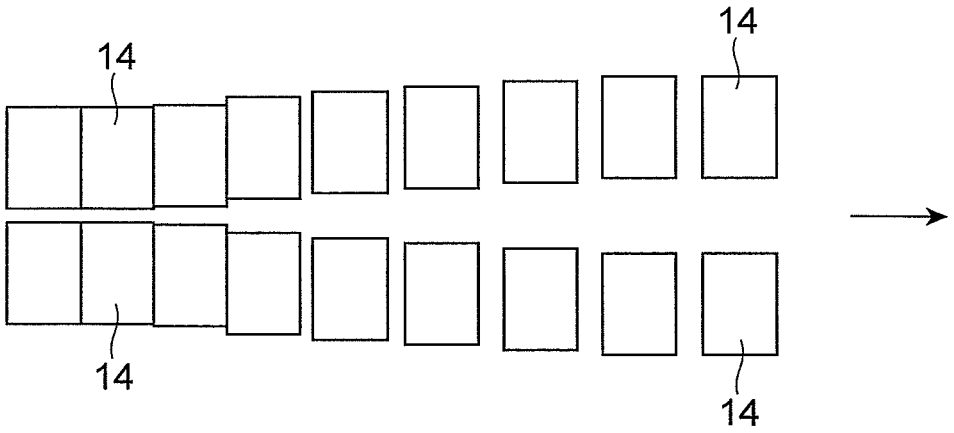
Fig.11

Fig.12



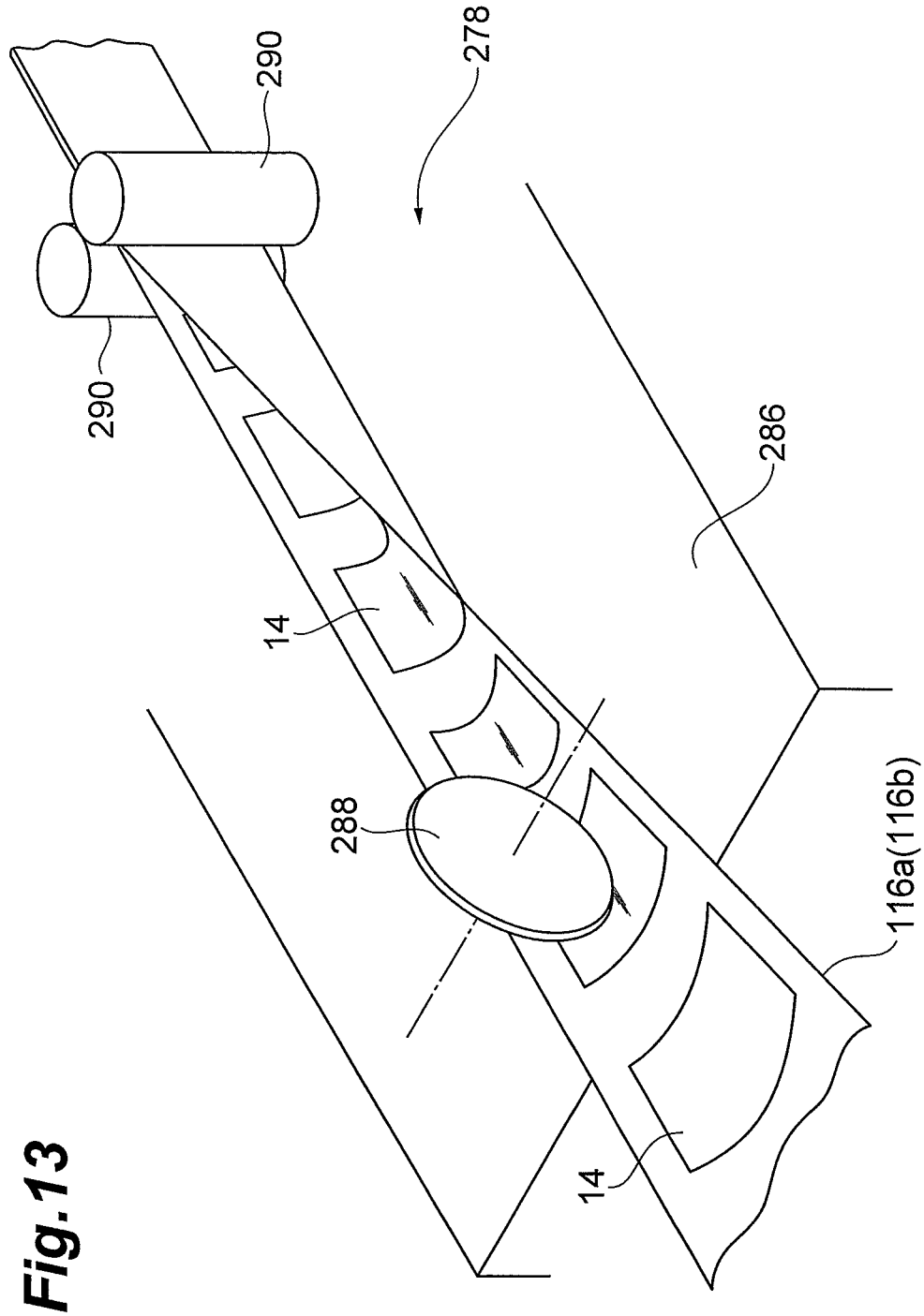


Fig.13

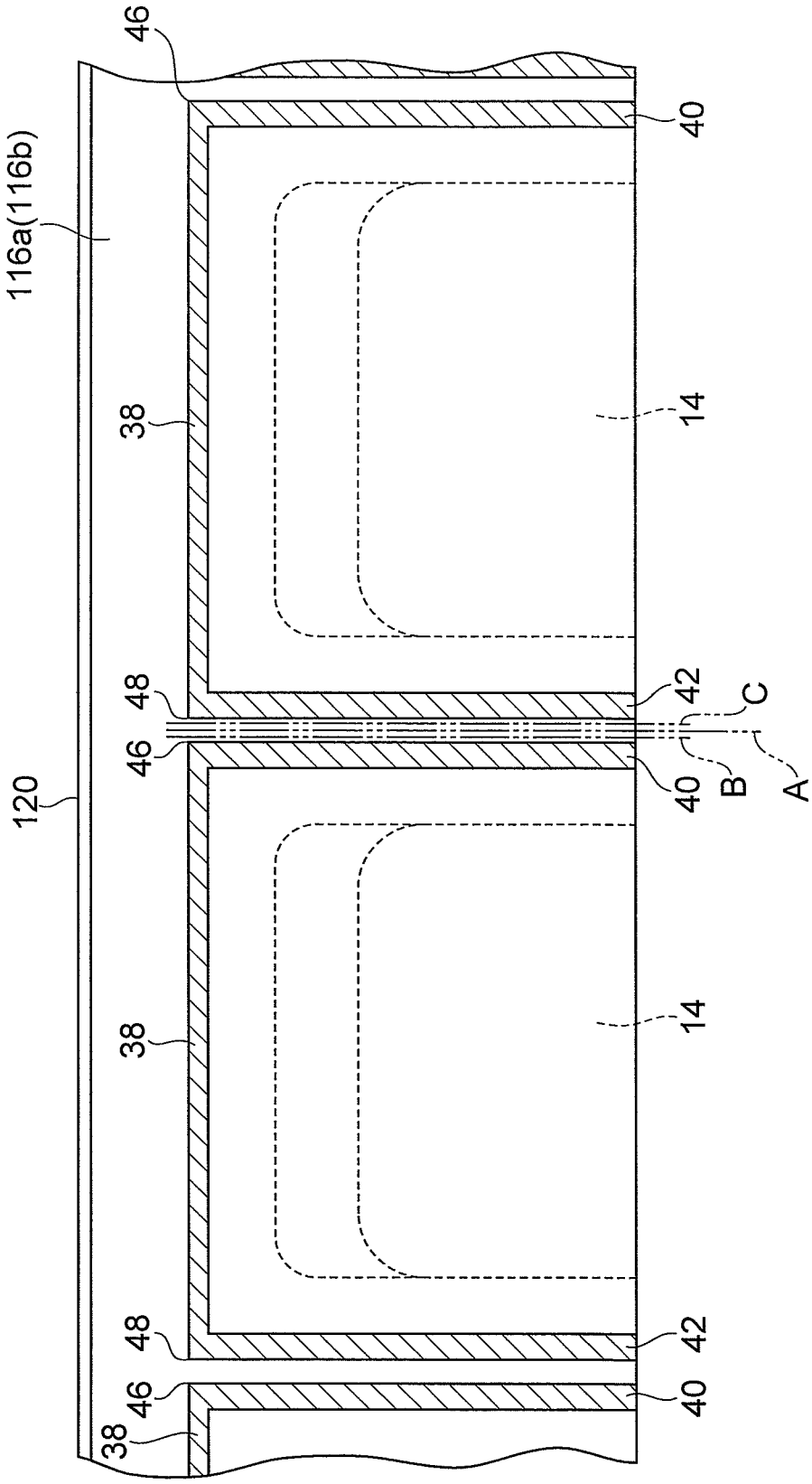
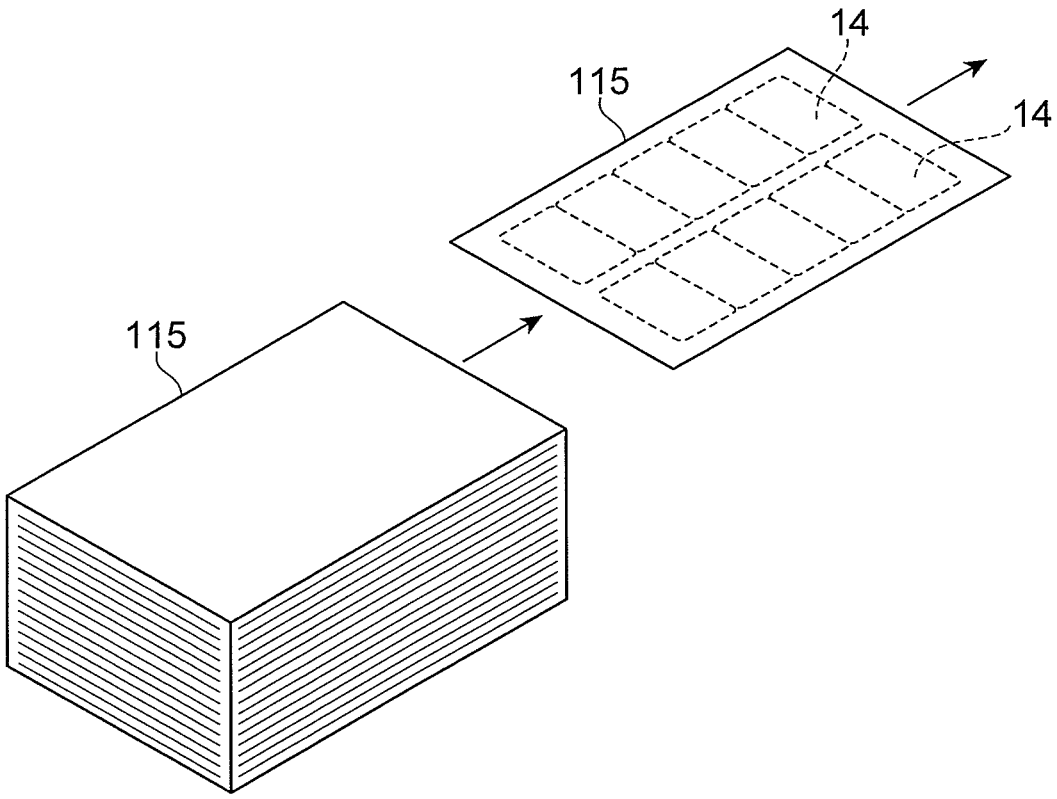


Fig.14

Fig.15



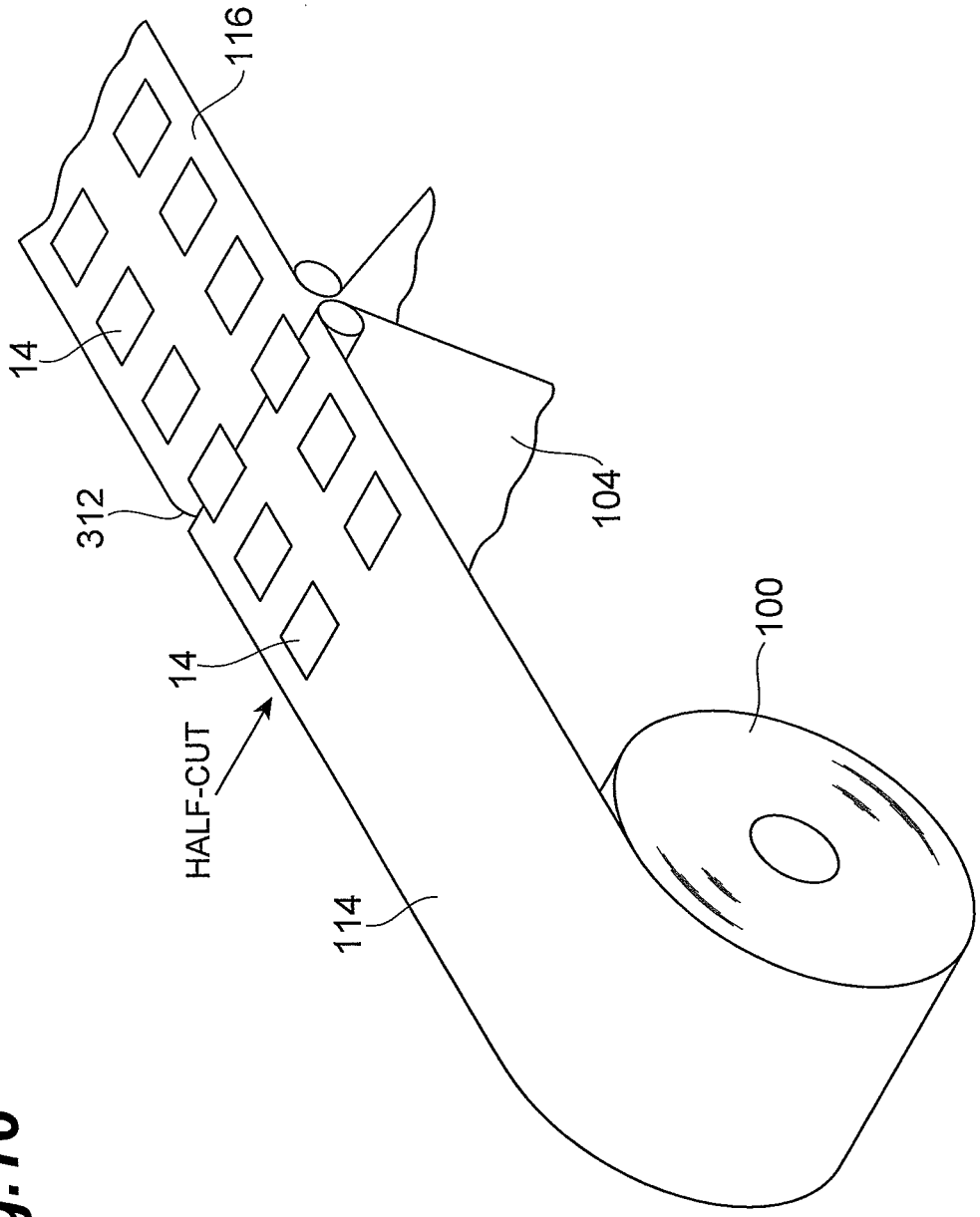


Fig.16

METHOD FOR PRODUCING PRESSURE-SENSITIVE ADHESIVE TAPE PACKAGE

This is a National Phase Application filed under 35 U.S.C. §371 as a national stage of PCT/JP2012/077321, filed on Oct. 23, 2012, an application claiming the benefit under 35 U.S.C. §119 of Japanese Application No. P2011-233069, filed on Oct. 24, 2011, the content of each of which is hereby incorporated by reference in their entirety.

TECHNICAL FIELD

The present invention relates to a package that packs a pressure-sensitive adhesive tape having an adhesive agent layer on a support, and more specifically relates to a method for producing the package.

BACKGROUND ART

Pressure-sensitive adhesive tapes in a variety of forms have conventionally been known and used for labels, medical care, cosmetics, decoration, masking, industries, and other various applications. The adhesive tape used for medical care is in a form of a patch preparation such as a poultice, a plaster, an adhesive bandage, a surgical tape, and a tape preparation, and usually applied onto a skin, a mucous membrane, or the like.

Such an adhesive tape usually comprises a support and an adhesive agent layer provided on one surface of the support, and a release sheet releasably attached to the adhesive agent layer. The adhesive tape, after production, may be cut into an appropriate size and distributed and sold in the state of being individually contained in a package for hygienic and physical protection. In this case, at the time of use thereof, the adhesive agent layer is applied onto a portion for application after tearing the package to remove the adhesive tape therefrom, and release the release sheet to expose the adhesive agent layer.

A problem that occurs at the time of use in some cases is difficulties in releasing the release sheet. That is, because the release sheet is usually thin and soft, it is difficult to handle, and it may take some time to release the release sheet. At the time of use of the adhesive tape, the release sheet and the package are turned into a waste after use.

Then, a pressure-sensitive adhesive tape package described in Patent Literature 1 has been proposed in the related art. The package is a package in which an adhesive tape is bent into two such that an adhesive agent layer faces outwardly, the two-folded adhesive tape is covered with a release sheet so as to sandwich the adhesive tape inside of the release sheet, and the periphery of the release sheet is sealed. In this configuration, the release sheet functions as a package, and thus the package needed in the related art can be eliminated.

Moreover, to expose only a half of the adhesive agent layer when the front portion of the release sheet is pulled off from the rear portion thereof to open the package, means for temporarily attaching the half located on the front side of the two-folded adhesive tape to the rear portion of the release sheet is provided. Thereby, application to a portion for application is easy because when the package is opened, the adhesive tape folded in two is held by the front portion of the release sheet and the half on the front side of the adhesive agent layer is exposed.

CITATION LIST

Patent Literature

Patent Literature 1: WO2010/071104

SUMMARY OF INVENTION

Technical Problem

It is easy to produce the above pressure-sensitive adhesive tape package one by one, but various devices are needed in mass production. Accordingly, an object of the present invention is to provide a method for producing a pressure-sensitive adhesive tape package suitable for mass production.

Solution to Problem

In order to achieve the above object, the method for producing a pressure-sensitive adhesive tape package according to the present invention is a method for producing a pressure-sensitive adhesive tape package, the pressure-sensitive adhesive tape package accommodating a pressure-sensitive adhesive tape having a support and an adhesive agent layer provided on one surface of the support, the pressure-sensitive adhesive tape package comprising a release sheet to which the adhesive agent layer of the adhesive tape is releasably attached, the method comprising: a step of feeding a release sheet base material serving as the release sheet to a predetermined feed position; a step of sequentially feeding a plurality of adhesive tapes in a row to the release sheet base material at the feed position, and boding the adhesive tapes to the release sheet base material such that predetermined spaces are formed between the adhesive tapes adjacent in anterior and posterior directions of the feeding direction; a step of folding the release sheet base material with the adhesive tape in two; a step of sealing a predetermined portion of the release sheet base material to form the two-folded release sheet base material including a plurality of accommodating spaces each of which accommodates one adhesive tape; a step of temporarily attaching a part of each adhesive tape to the release sheet base material; and a step of cutting the release sheet base material to form pressure-sensitive adhesive tape packages.

As the step of bonding the adhesive tapes to the release sheet base material, a step comprising a substep of cutting an adhesive tape base material serving as the adhesive tape to form a row of adhesive tapes and a substep of separating adjacent adhesive tapes from each other, and conveying the adhesive tapes to the feed position with an interval between the adjacent adhesive tapes being increased is thought.

Alternatively, the step of boding the adhesive tapes to the release sheet base material may comprises a substep of half-cutting an adhesive tape base material having a liner without cutting the liner so as to form a row of adhesive tapes on the liner, and a substep of conveying the adhesive tapes to the feed position while the liner is being released.

In the above method, the adhesive tapes in a row are fed to the release sheet base material. It is also thought that the adhesive tapes are formed in two or more rows, and the interval between the adhesive tapes is increased not only anterior and posterior directions to the feeding direction but also in the left and right traverse directions thereof. In this case, a plurality of rows of a plurality of adhesive tapes are sequentially fed to the release sheet base material at the feed position, and the adhesive tapes are bonded to the release sheet base material such that predetermined spaces are formed between adjacent adhesive tapes in anterior, posterior,

left, and right directions of the feeding direction. The release sheet base material is then slit along the longitudinal direction thereof to form a plurality of release sheet base materials, a row of adhesive tapes being bonded to each of the release sheet base materials.

The step of bonding the adhesive tapes to the release sheet base material comprises a substep of cutting an adhesive tape web into a plurality of rows of adhesive tapes and a substep of separating adhesive tapes adjacent in anterior, posterior, left, and right directions from each other and conveying the adhesive tapes to the feed position with the intervals therebetween being increased.

Alternatively, the step of bonding the adhesive tapes to the release sheet base material may comprise a substep of half-cutting an adhesive tape base material having a liner without cutting the liner so as to form a plurality of rows of adhesive tapes on the liner, and a substep of conveying the adhesive tapes to the feed position while the liner is being released.

It is preferable that the sealing is heat sealing. It is preferable that temporary attachment is performed by thermal bonding.

Furthermore, it is preferable that in the step of sealing a predetermined portion of the release sheet base material, two sealed portions are formed at a constant interval between adjacent accommodating spaces, and in the step of cutting the release sheet base material, cutting is performed between the two sealed portions.

Advantageous Effects of Invention

According to the production method according to the present invention, production efficiency is improved because the adhesive tapes are bonded to the release sheet base material, and the release sheet base material is folded in two, and is cut. Namely, if the release sheet base material is cut in advance to prepare release sheets having a size of the product, and the adhesive tapes are bonded to the release sheets one by one, a complex production facility for handling separated release sheets and separated adhesive tapes is needed, leading to poor efficiency and an increase in cost of the production facility. The method according to the present invention has no such problems, and improves production efficiency remarkably.

Moreover, after the adhesive tapes are bonded to the release sheet base material, a plurality of adhesive tapes can be accommodated in a single release sheet base material in batch and be temporarily attached to the release sheet base material. This also contributes to improvement in production efficiency.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a front view of a pressure-sensitive adhesive tape package produced by a method for producing a pressure-sensitive adhesive tape package according to the present invention.

FIGS. **2**(*a*) to **2**(*c*) are perspective views showing a simple method for producing the pressure-sensitive adhesive tape package in FIG. **1**.

FIG. **3** is a schematic sectional view taken along the line in FIG. **1**.

FIGS. **4**(*a*) and **4**(*b*) are drawings showing other shapes of the temporary attach portion, respectively.

FIGS. **5**(*a*) and **5**(*b*) are perspective views showing a method for using the pressure-sensitive adhesive tape package in FIG. **1**.

FIGS. **6**(*a*) to **6**(*d*) are drawings illustrating scenes in which an adhesive tape is applied to a portion for application using the pressure-sensitive adhesive tape package in FIG. **1**.

FIG. **7** is a schematic view showing the steps of the method for producing a pressure-sensitive adhesive tape package according to the present invention.

FIG. **8** is a schematic view of the production steps continuing from FIG. **7**, FIG. **8**(*a*) is a plan view thereof, and FIG. **8**(*b*) is a side view thereof.

FIG. **9** is a diagram illustrating cutting positions of an adhesive tape web.

FIG. **10** is a plan view schematically showing an example of separating and conveying apparatus usable for the method for producing a pressure-sensitive adhesive tape package according to the present invention.

FIG. **11** is a side view schematically showing a suitable separating and conveying apparatus usable for the method for producing a pressure-sensitive adhesive tape package according to the present invention.

FIG. **12** is a schematic diagram showing the trajectory of the adhesive tape conveyed by the separating and conveying apparatus in FIG. **11**.

FIG. **13** is a perspective view schematically showing a bending apparatus usable for the method for producing a pressure-sensitive adhesive tape package according to the present invention.

FIG. **14** is a front view of a release sheet web in which the positions of sealed portions are shown.

FIG. **15** is a schematic view showing another embodiment of the method for producing a pressure-sensitive adhesive tape package according to the present invention.

FIG. **16** is a schematic view showing still another embodiment of the method for producing a pressure-sensitive adhesive tape package according to the present invention.

DESCRIPTION OF EMBODIMENTS

Hereinafter, with reference to the drawings, suitable embodiments according to the present invention will be described. Through all the drawings, same reference numerals will be given to same or equivalent portions, and the duplicate description thereof will be omitted.

FIG. **1** is a front view showing a pressure-sensitive adhesive tape package **10** which can be produced by a production method according to the present invention, and FIGS. **2**(*a*) to **2**(*c*) are perspective views showing a configuration of the pressure-sensitive adhesive tape package **10** in FIG. **1** in more detail. FIG. **3** is a schematic sectional view taken along the line in FIG. **1**.

The shown pressure-sensitive adhesive tape package **10** includes a pressure-sensitive adhesive tape **14** having an adhesive agent layer **12** on one surface thereof, and a release sheet **16** for sealing the adhesive tape **14** folded in two. The adhesive tape **14** and the release sheet **16** both are rectangular. As understood from FIG. **1** and FIG. **2**(*c*), the pressure-sensitive adhesive tape package **10** is the so-called three-sealed package type in which one release sheet **16** is bent, and three sides except the bend side are sealed.

The pressure-sensitive adhesive tape package **10** is used for labels, medical care, cosmetics, decoration, masking, industries, and other various applications. Particularly, the pressure-sensitive adhesive tape package used for medical care, cosmetics, and the like can be used as a package of a patch preparation such as a plaster, a poultice, an adhesive bandage, a surgical tape, a cosmetic face pack preparation, a tape preparation, and an adhesive heating pack that is usually applied to a skin, a mucous membrane, and the like.

As shown in FIG. **3**, the adhesive tape **14** includes a support **18**, and the adhesive agent layer **12** laminated on the one surface thereof, and the release sheet **16** is releasably attached to this. The component material of the support **18** is not limited as long as it can support the adhesive agent layer **12**, and usually, woven fabrics, non-woven fabrics, films made of a plastic or the like, metallic foils, and the like are used. Further, the support may be a single layer structure or a laminate structure; it may be a structure in which a plurality of woven fabrics or non-woven fabrics made of different materials is laminated, or a structure in which a plastic film, a metallic foil, or the like and a woven fabric or a non-woven fabric are laminated, for example.

Moreover, the woven fabric or non-woven fabric used for the adhesive tape **14** of the present embodiment is not particularly limited, and may be those obtained by processing a fibrous material into a fabric and applicable for the support **18** of the adhesive tape **14**; examples thereof include a knitted fabric processed into a fabric by collecting stitches by circular knit, warp knit, weft knit, and the like.

Preferable examples of the woven fabric or non-woven fabric include woven fabrics or non-woven fabrics made of at least one kind of resin fibers selected from the group consisting of polyester resins, polyethylene resins, and polypropylene resins; among them, the woven fabrics made of polyethylene terephthalate that is polyester with less interaction with the component contained in the adhesive agent layer are preferable.

Examples of the plastic film include those formed using polyesters such as polyethylene terephthalate, polyamides such as nylon, polyolefins such as polyethylene and polypropylene, polyvinyl chloride, plasticized polyvinyl chloride, plasticized vinyl acetate-vinyl chloride copolymers, polyvinylidene chloride, ethylene-vinyl acetate copolymers, cellulose acetate, ethyl cellulose, ethylene-ethyl acrylate copolymers, polytetrafluoroethylene, polyurethanes, and ionomer resins. Moreover, in the case where the adhesive tape **14** is used as the patch preparation for medical care or cosmetics, it is preferable that a material having sufficient stretchability or non-stretchability as a patch preparation is used for the support **18**, and a polyethylene terephthalate hosiery woven fabric (knitted fabric) is particularly preferable.

It is preferable that in the knitted fabric as the support **18**, the basis weight (mass per units) is 50 to 500 g/m^2. Moreover, in the case where the support **18** is measured according to the method of JIS L1018, it is preferable that the modulus in the longitudinal length (long axis direction) is 2 to 12 N/5 cm, and the modulus in the traverse direction (short axis direction) is also 2 to 12 N/5 cm. The longitudinal length here refers to a flow direction at a step of producing a knitted fabric, and the traverse direction refers to a direction perpendicular to the longitudinal length, namely the width direction. In the case where the modulus is smaller than 2 N/5 cm in the longitudinal length or traverse direction, application to the portion for application while unwrinkling tends to be difficult; moreover, in the case where the modulus is larger than 12 N/5 cm in the longitudinal length or traverse direction, conversely, the adhesive tape tends to be excessively stretched during application to cause wrinkles. The modulus is a value of the stress at room temperature (25° C.), and at 50% extension.

By use of the support **18** above, temporary attach portions **50**, **52**, and **54** by the temporary attaching means described later is facilitated, and the shape and structure of the support **18** after the support is removed from the temporary attach portions **50**, **52**, and **54** are hardly changed. Namely, fuzzing or the like is not produced, for example. Moreover, bending the pressure-sensitive adhesive tape package **10** into two is easy, and the bent pressure-sensitive adhesive tape package is not bulky. Further, the so-called "kink" is hardly produced in the portion that is bent into two during application, and the adhesive tape is applied neatly.

The adhesive component that is the component material of the adhesive agent layer **12** is not particularly limited as long as it has adhesiveness and can be applied to the portion for application; acrylic adhesive components, rubber based adhesive components, silicone based adhesive components, and the like are preferably used as an adhesive base; among them, the rubber based adhesive components are particularly preferably used from the viewpoint of adhesiveness.

As a specific example of the rubber based adhesive component, natural rubbers and synthetic rubbers both can be used, and examples of the synthetic rubbers include styrene block copolymers and polyisobutylene. Further, examples of the styrene block copolymers include styrene-butylene-styrene block copolymers (SBS), styrene-isoprene-styrene block copolymers (SIS), styrene-ethylene/butylene-styrene block copolymers (SEBS), and styrene-ethylene/propylene-styrene block copolymers (SEPS). Specific examples of the styrene block copolymers include linear triblock copolymers such as Kraton D-1112, D-1111, and D-1107 (trade name, made by Kraton Performance Polymers Inc), JSR5000 or JSR5002 (trade name, made by JSR Corporation), Quintac 3530, 3421 or 3570C (trade name, made by Zeon Corporation), and Kraton D-KX401CS or D-1107CU (trade name, made by Kraton Performance Polymers Inc), and branched block copolymers such as Kraton D-1124 (trade name, made by Kraton Performance Polymers, Inc.) and Solprene 418 (trade name, made by Phillips Petroleum Company).

As polyisobutylene, for example, high or low molecular weight are used, and examples thereof include Oppanol B10, B12, B12SF, B15, B15SF, B30SF, B50, B50SF, B80, B100, B120, B150, and B200 (trade name, made by BASF SE), and Vistanex LM-MS, LM-MH, LM-H, MM L-80, MM L-100, MM L-120, and MM L-140 (trade name, made by Exxon Chemical Company).

Moreover, as the acrylic polymer, a polymer or copolymer containing at least one (meth)acrylate ester such as 2-ethylhexyl acrylate, methyl acrylate, butyl acrylate, hydroxyethyl acrylate, 2-ethylhexyl-methacrylate as a monomer unit is used, and acrylic acid/acrylic acid octyl ester copolymers, 2-ethylhexyl acrylate/N-vinyl-2-pyrrolidone/1,6-hexaneglycol dimethacrylate copolymers, 2-ethylhexyl acrylate/vinyl acetate copolymers, 2-ethylhexyl acrylate/vinyl acetate/acrylic acid copolymers, 2-ethylhexyl acrylate/2-ethylhexyl-methacrylate/dodecyl methacrylate copolymers, a methyl acrylate/2-ethylhexyl acrylate co polymerized resin emulsion, an adhesive agent of an acrylic polymer or the like contained in an acrylic resin alkanolamine solution, DURO-TAK acrylic adhesive agent series (made by National Starch and Chemical Company), GELVA acrylic adhesive agent series (made by Monsanto Company), SK-Dyne Matriderm (Soken Chemical & Engineering Co., Ltd.), EUDRAGIT series (Higuchi Inc.), and the like can be used, for example.

One of the adhesive bases such as the rubber adhesive base, the acrylic adhesive base, and the silicone adhesive base above can be used, or two or more thereof can be mixed and used.

Further, in the case where the adhesive tape **14** is used as a poultice or a plaster for medical care or a cosmetic face pack agent, a water-soluble polymer can also be used as the adhesive agent layer **12**; as such a water-soluble polymer, gelatin, agar, alginic acid, mannan, carboxymethyl cellulose or salts thereof, hydroxypropyl cellulose or salts thereof, polyvinyl alcohol, polyacrylic acid or salts thereof, and the like, or those

obtained by crosslinking at least one of these by an organic or inorganic crosslinking agent are preferably used.

Other than the adhesive bases above, a tackifier, a softening agent, a solvent, water, a thickener, a wetting agent, a filler, a crosslinking agent, a polymerizing agent, a solubilizing agent, an absorption promoter, a stabilizer, an antioxidant, an emulsifier, a surface active agent, a pH adjuster, drugs, an ultraviolet absorbing agent, and the like are properly added to the adhesive agent layer.

The drugs in the case where the adhesive tape **14** is used as the patch preparation for medical care and cosmetics are not particularly limited as long as they are percutaneously absorbed into the body to demonstrate a pharmacological effect, and examples thereof include an antiinflammatory agent, an analgesic agent, an antihistamine, a local anesthetic agent, a blood circulation promoter, an anesthetic agent, a tranquilizer, an antihypertensive agent, an antibacterial agent, and a vasodilator.

The release sheet **16** usually used for the package of the adhesive tape **14** can be used. The release sheet **16** may be formed of a single layer or a laminate, and the constitutional material is not particularly limited as long as the innermost layer (layer which is the inside of the package) can be used in the production method according to the present invention, and particularly, can be heat sealed or thermally bonded. For example, the base material of the release sheet **16** can be properly selected from paper, non-woven fabrics, aluminum, cellophane, nylon, high density or low density polyethylene, polyethylene terephthalate, polypropylene, polyvinyl chloride, polyamide, polyvinylidene chloride, polyvinyl alcohol, polyvinyl acetate copolymers, polycarbonate, polystyrene, ethylene vinyl alcohol copolymers, and the like. Among these, when a material that cannot be molten by heating is used as the base material, a laminate of a thermoplastic material is suitable for the layer that is the inside of the package. Particularly, a sheet made of polyethylene, aluminum, and polyethylene sequentially stacked is preferable, and a sheet thereof further including the outermost layer (layer that is the outside of the package) of cellophane is preferably used.

Further, the release sheet may be those in which a printing ink or an adhesive is applied to the outermost layer, or those on which a thin film is provided by a method such as deposition or sputtering. As the thin film, thin films with high gas barrier properties and transparency made of silicon oxide, magnesium oxide, and aluminum oxide other than metals such as aluminum are suitable.

Because these release sheets **16** are bent when the adhesive tape **14** is sealed, those having flexibility are preferable. Accordingly, the thickness of the release sheet **16** is not particularly limited as long as it can be bent, and it is preferable that the thickness is in the range of 10 to 500 μm, and it is more preferable that the thickness is in the range of 15 to 300 μm.

Here, with reference to FIG. **2**(*a*), FIG. **2**(*a*) shows the state in which the adhesive tape **14** is releasably attached onto the release sheet **16** with the adhesive agent layer **12** facing downwardly. In this state, the adhesive tape **14** is attached to the release sheet **16** in a state where the center line parallel to the short direction of the adhesive tape **14** may be displaced from the center line parallel to the short direction of the release sheet **16**. When the release sheet **16** and the adhesive tape **14** are bent together, as shown in (b) of FIG. **2**, the adhesive tape **14** folded in two is sandwiched in the two-folded release sheet **16**.

Here, assume that a half of the bent release sheet **16** is referred to as the first portion **22**, the other half thereof is referred to as the second portion **24**, a half of the adhesive tape **14** bent with the release sheet **16** is referred to as a first portion **26**, and the other half thereof is referred to as a second portion **28**. With the release sheet **16** bent, the first portion **22** and the second portion **24** of the release sheet **16** have substantially the same shape and size, while the adhesive tape **14** is in the state where the first portion **26** is larger than the second portion **28** and the first portion **26** has an extending portion **30** extending from the second portion **28**. In this state, of the portion of the release sheet **16** in which the first portion **22** is layered on the second portion **24**, the three sides surrounding the adhesive tape **14** are heat sealed to obtain the pressure-sensitive adhesive tape package **10** shown in FIGS. **1**, **2**(*c*), and **3**.

In such a pressure-sensitive adhesive tape package **10**, when the first portion **22** of the release sheet **16** is pulled off from the second portion **24** thereof to open the package, the adhesive agent layer **12** in the two-folded adhesive tape **14** faces outwardly. Accordingly, the adhesive agent layer **12** in the first portion **26** in the adhesive tape **14** is exposed to the outside.

However, if the first portion **26** of the adhesive tape **14** moves together with the first portion **22** of the release sheet **16** and the adhesive agent layer **12** in the second portion **28** of the adhesive tape **14** is exposed, whether the adhesive agent layer **12** is exposed on the front side or rear side cannot be known, and this is inconvenient. Namely, it is important to primarily hold the first portion **26** of the adhesive tape **14** by the second portion **24** of the release sheet **16** when the package is opened, and expose the adhesive agent layer **12** in the first portion **26** of the adhesive tape **14**. Then, the extending portion **30** formed on the first portion **26** of the adhesive tape **14** is temporarily attached to the second portion **24** of the release sheet **16** at places indicated by symbols **50**, **52**, and **54**.

Thermal bonding is effective as the temporary attach means. Namely, when heat is applied from the outer surface side of the release sheet **16**, the thermoplastic material that forms the innermost layer of the release sheet **16** is molten, adheres to the support **18** in the adhesive tape **14**, and is then solidified. For this reason, the extending portion **30** of the adhesive tape **14** is temporarily attached to the second portion **24** of the release sheet **16**. Particularly, when the support **18** of the adhesive tape **14** is made of a woven fabric or a knitted fabric, a molten thermoplastic material permeates into the support, and the temporary attaching effect is further improved.

Moreover, for the position in which the temporary attach portions **50**, **52**, and **54** is disposed, as shown in FIG. **1**, it is suitable that the temporary attach portions **52**, **54** is formed on not only the line along the first sealed portion **38** but also the line along the second sealed portion **40** and the line along the third sealed portion **42**. Thereby, even if the first portion **22** of the release sheet **16** is pulled off from the second portion **24** thereof in the traverse direction, the temporary attaching effect can be guaranteed. The lines on which the temporary attach portions **50**, **52**, and **54** are disposed are not limited to straight lines. The lines may be curves, or may be disposed on multiplets. Furthermore, it can be thought that the lines are disposed in a staggered pattern, a zigzag pattern, or a random patter as long as the lines are aligned with the first sealed portion **38**, the second sealed portion **40**, and the third sealed portion **42**, respectively.

If the adhesive force is excessively increased by the temporary attach portions **50**, **52**, and **54**, a problem that the adhesive tape **14** is difficult to release from the release sheet **16** in application to the portion for application may arise. Then, the adhesive force of the extending portion **30** of the adhesive tape **14** to the release sheet **16** is preferably larger

than the adhesive force (tackiness) of the adhesive agent layer **12** to the release sheet **16**. Namely, the adhesive force of the support **18** to the release sheet **16** through the temporary attach portions **50**, **52**, and **54**, the adhesive force (tackiness) of the adhesive agent layer **12** of the adhesive tape **14** to the portion for application, and the adhesive force of the adhesive agent layer **12** of the adhesive tape **14** to the release sheet **16** are in a relation as follows.

the adhesive force of the adhesive agent layer **12** to the portion for application

the adhesive force of the support **18** to the release sheet **16** through the temporary attach portions **50**, **52**, and **54**

the adhesive force of the adhesive agent layer **12** to the release sheet **16**

In the case where the temporary attach portions **50**, **52**, and **54** is in a continuous band-like shape, it can be thought that the amount of the thermoplastic material in the release sheet **16** to be impregnated into the woven fabric of the support **18** in the adhesive tape **14** is excessively large, and it is difficult to obtain the relationship above. Then, in the present invention, as shown in FIGS. **1** to **3** by symbols **50**, **52**, and **54**, the temporary attach portions **50**, **52**, and **54** is discontinuously formed to adjust the number and size of temporary attach portions **50**, **52**, and **54**. Thereby, the adhesive force of the temporary attach portions **50**, **52**, and **54** can be easily adjusted. Thereby, the production efficiency of the pressure-sensitive adhesive tape package **10** is further improved, and constant quality can be ensured in the action effect. Note that the shapes of the temporary attach portions **50**, **52**, and **54** are also not limited to the rectangular shape shown in FIG. **1**, and various shapes such as a triangular shape shown in FIG. **4**(*a*) and an oval shape shown in FIG. **4**(*b*) can be thought.

Further, it is preferable that the release sheet **16** has means for reducing an adhesive force **55** that reduces an adhesive force between the adhesive agent layer **12** of the adhesive tape **14** and the release sheet **16**. As this means for reducing an adhesive force **55**, the innermost layer of the release sheet **16** may be subjected to the releasing treatment. Examples of the releasing treatment include, other than a method using a release agent, a method such as embossing and sandmat processing that physically makes releasing easy. As the release agent, any of silicone release agents, alkyl pendant release agents, condensed wax release agents, and the like can be used; among these, the silicone treatment using the silicone release agent is preferable. The silicone treatment is advantageous in that it is performed relatively easily and at low cost. By performing the silicone treatment, in corporation with said the temporary attach portions **50**, **52**, and **54**, upon use of the pressure-sensitive adhesive tape package **10**, when the release sheet **16** is opened, the adhesive agent layer **12** is easily removed from the release sheet **16** to expose the adhesive agent layer **12**; for this reason, application to the portion for application is easy. As described above, the means for reducing an adhesive force **55** may be provided across the adhesive agent layer **12** of the adhesive tape **14**, or may be provided to cover only the adhesive agent layer **12** in the first portion **26** of the adhesive tape.

Next, with reference to FIGS. **5** and **6**, the action of the pressure-sensitive adhesive tape package **10** according to the present embodiment will be described.

FIG. **5**(*a*) shows a perspective view of the pressure-sensitive adhesive tape package **10** according to the present embodiment. From this state, a user holds the holding portion **44** of the release sheet **16** (fingers are not shown), and starts to pull off the first portion **22** of the release sheet **16** from the second portion **24** in the direction of an arrow A. Generally, such a pressure-sensitive adhesive tape package **10** is mostly opened from the edge. Accordingly, if the package **10** is started to open from the corner as shown in FIG. **5**(*a*), the force concentrates on the corner **46** of the traverse sealed portion **40** and the longitudinal sealed portion **38**, and breakage of the sealed portions **38** and **40** is easily started. Once the breakage in the sealed portions **38** and **40** is started, breakage propagates to other portions from the breakage start point as a starting point without additionally applying a large force to break the entire sealed portions **38**, **40**, and **42**. Finally, the pressure-sensitive adhesive tape package **10** reaches the state in FIG. **5**(*b*). As described above, the first portion **26** of the adhesive tape **14** is primarily held on the side of the second portion **24** of the release sheet **16** by existence of the temporary attach portions **50**, **52**, and **54**. As a result, the adhesive agent layer **12** in the first portion **26** of the adhesive tape **14** is exposed.

FIGS. **6**(*a*) to **6**(*d*) show aspects in the case where the adhesive tape of the present invention is used particularly as the patch preparation for medical care or cosmetics, while the adhesive tape of the present invention can also be applied by the same method in the case of use in other application. First, the opened pressure-sensitive adhesive tape package **10** is held by one hand, and placed in the portion for application or in the vicinity of the portion for application as shown in FIGS. **6**(*a*) and **6**(*b*). Next, as shown in FIG. **6**(*c*), while the first portion **22** of the release sheet **16** is held, the release sheet **16** is pulled along the skin in the longitudinal direction thereof and a direction away from the adhesive tape **14**. As the release sheet **16** is pulled away, the second portion **28** of the adhesive tape **14** is released from the release sheet **16** and simultaneously applied to the portion for application. Particularly, because the adhesive tape **14** is applied while the release sheet **16** is pulled, the adhesive tape **14** can be applied without a wrinkle. FIG. **6**(*d*) shows the state where the whole adhesive tape **14** is applied to the portion for application to finish application.

The adhesive tape of the present invention can be held by hand because the first portion **22** of the release sheet **16** released off from the adhesive agent layer **12** can be supported by the thumb of the hand on which the adhesive tape is placed. Accordingly, a risk of dropping the adhesive tape when the adhesive tape is applied to the portion for application is small, and worries about shifting of the adhesive tape or hanging of the adhesive tape by gravity in an unintended direction during application are small; for this reason, the adhesive tape can be applied to the portion for application to be targeted for in a carefree manner. The adhesive tape can be easily applied by a single hand even if the portion for application is a back or the like in which application is difficult by oneself.

If in production of such a pressure-sensitive adhesive tape package **10**, the adhesive tape **14** and the release sheet **16** cut into predetermined sizes are prepared, and the package is produced one by one in the manner shown in FIG. **2**, production efficiency is low and the so-called mass production is extremely difficult. Then, the present invention provides the method for producing a pressure-sensitive adhesive tape package and the facility that improve production efficiency and are suitable for mass production.

FIG. **7** and FIG. **8** schematically show the method for producing the pressure-sensitive adhesive tape package **10** according to the present invention. In FIG. **7**, symbol **200** indicates an adhesive tape web feeding apparatus which holds an adhesive tape roll **100**. An adhesive tape web **114** is fed out from the adhesive tape web feeding apparatus **200**. The adhesive tape roll **100** is prepared by rolling a long adhesive tape base material, that is, the adhesive tape web **114** into a roll-like shape. The adhesive tape web **114** can be cut vertically

and horizontally to form the adhesive tape **14** having a size of product. The adhesive tape web **114** including a portion formed of the support **18** and the adhesive agent layer **12** of the adhesive tape **14** and a liner **104** separably bonded to the adhesive agent layer **12** is suitably used.

The adhesive tape web **114** fed out from the adhesive tape web feeding apparatus **200** is fed via a tension adjusting apparatus **202** to a liner releasing apparatus **204**. The liner releasing apparatus **204** is known. The liner **104** is released from the adhesive tape web **114** fed to the liner releasing apparatus **204**. In the embodiment, the adhesive tape web **114** without a liner is derived from the liner releasing apparatus **204** with the adhesive agent layer **12** being on the lower side.

As the adhesive tape web **114**, those not having the liner **104** or those formed of only a portion serving as the support **18** are thought. For the adhesive tape web **114** not having the liner **104**, the liner releasing apparatus **204** is of course unnecessary. For the adhesive tape web **114** formed of only a portion serving as the support **18**, a spreading apparatus (not shown) is provided downstream of the adhesive tape web feeding apparatus **200**. In the spreading apparatus, an adhesive agent is spread over one surface of the web fed out from the adhesive tape roll, which serves as the support. The spreading apparatus is also known in the related art.

A cutting apparatus **206** for cutting the adhesive tape web **114** in the feeding direction and the traverse direction (horizontal direction intersecting perpendicular to the feeding direction of the adhesive tape web **114**) is provided downstream of the liner releasing apparatus **204**. Various types of the cutting apparatus **206** are thought. In the embodiment illustrated, a rotary cutter including a die cut roll **208** having a blade and an anvil roll **210** that contacts the die cut roll and rotates is used. When the adhesive tape web **114** is fed between the die cut roll **208** and the anvil roll **210**, the adhesive tape **14** having a size of product is punched out of the adhesive tape web **114**, and is fed downstream.

In FIG. **9**, portions in which the adhesive tape web **114** is punched out are expressed by dotted lines, and hatched portions are discharged as a waste. As understood from FIG. **9**, in the present embodiment, the adhesive tape **14** after cutting is fed in two rows in the feeding direction of the adhesive tape web **114** (arrow direction in FIG. **9**) from the cutting apparatus **206**.

In the cutting apparatus **206** in the present embodiment, the die cut roll **208** is provided on the lower side and the anvil roll **210** is provided on the upper side. Accordingly, the adhesive agent layer of the adhesive tape web **114** contacts the die cut roll **208**. For this reason, the surface of the die cut roll **208** is subjected to a known releasing treatment such that the adhesive tape **14** after punching can be easily released from the die cut roll **208**, and the tackiness between the die cut roll **208** and the adhesive tape web **114** is made extremely small. The anvil roll **210** is formed of a cylindrical body on which many small holes are formed. The anvil roll **210** has a structure that enables adsorption of the adhesive tape web **114** contacting the surface by sucking air inside of the anvil roll. Accordingly, the punched adhesive tape **14** can be released from the die cut roll **208** without fail. With rotation of the anvil roll **210**, the adhesive tape **14** adsorbed by the anvil roll **210** is upwardly guided out of a feeding portion of the cutting apparatus **206** that does not adsorb the adhesive tape.

Individual adhesive tapes **14** fed from the cutting apparatus **206** are fed to the feed position indicated by symbol **212** in FIG. **7**, and are bonded to the long release sheet base material, that is, the release sheet web **116** which serves as the release sheet **16**. However, the interval between the adjacent adhesive tapes **14** is extremely narrow immediately after punching by the cutting apparatus **206**. If the adhesive tapes are placed on the release sheet web **116** as they are, there is no room for heat sealing of the package **10** in the final production step.

Then, in the present embodiment, a separating and conveying apparatus **214** is provided between the cutting apparatus **206** and the feed position **212** to convey the adhesive tapes **14** adjacent to each other in anterior, posterior, left, and right directions while the adjacent adhesive tapes are being separated from each other (interval being increased) in the feeding direction and in the traverse direction (horizontal direction intersecting perpendicular to the feeding direction).

The separating and conveying apparatus conveys the adhesive tapes while increasing the interval between the adjacent adhesive tapes **14** as described above. Various separating and conveying apparatuses are thought, for example, apparatuses including a plurality of robot apparatuses that move individual adhesive tapes **14** to desired positions with a suction type robot arm, or apparatuses including a belt conveyor apparatus.

In the separating and conveying apparatus including a robot apparatus, the arm of the robot apparatus mainly moves in the horizontal direction. For example, when two or more rows of adhesive tapes **14** are fed, it is thought that the layout of arrangement of the apparatuses is large in order to prevent interference between the robot arms.

As the separating and conveying apparatus including a belt conveyor apparatus, as shown in FIG. **10**, a plurality of belt conveyor apparatuses **150** disposed so as to radially extend is thought. Each of the belt conveyor apparatuses **150** includes a plurality of belt conveyors **152**, **154**, and **156** linearly disposed. The conveying rates of the belt conveyors **152**, **154**, and **156** become higher as the adhesive tape is conveyed toward the side downstream of each of the belt conveyor apparatuses **150**. In such a configuration, the interval in the feeding direction can be increased while the interval between the traverse directions is increased. In the separating and conveying apparatus including the belt conveyors, it is thought that an auxiliary apparatus is complex when feeding of the adhesive tape **14** to the conveyor, passing of the adhesive tape from conveyor to conveyor, and the like are stably operated.

FIG. **11** shows a suitable separating and conveying apparatus **214**, which is configured to circulate a holding base **216** that contacts and holds the surface of the support **18** of the adhesive tape **14** (surface opposite to the surface including the adhesive agent layer **12**), and gradually expands the interval between adjacent holding bases **216** in the anteroposterior direction during movement of the holding bases **216** and at the same time expands the left and right intervals between the holding bases **216**. The separating and conveying apparatus has a compact configuration having high efficiency in separating and conveying.

More specifically, the separating and conveying apparatus **214** includes a first circulating chain unit **218** disposed upstream of a production line (side close to the cutting apparatus **206**) and a second circulating chain unit **220** disposed downstream of the production line (side away from the cutting apparatus **206**). The circulation paths of chains **224** and **226** each include upstream and downstream vertical paths and upper and lower horizontal paths. A pin **228** is disposed at a constant pitch on the outer surfaces of left and right link plates that form the chains **224** and **226**. For example, although not limited to, the pitch of the pin **228** in the first circulating chain unit **218** is 100 mm, and the pitch of the pin **228** in the second circulating chain unit **220** is 130 mm.

A guiding plate for guiding the holding base **216** is disposed between left and right sprocket wheels **222** and **223**.

The guiding plate defines the circulation path formed of arc paths along the outer shapes of the sprocket wheels **222** and **223** and linear paths. The circulation path consists of a vertically ascending path **232** adjacent to the cutting apparatus **206**, an arc path along the outer shape of a sprocket wheel **222-1**, an upper traveling path **234** horizontally extending in the flow direction of the production line, an arc path along the outer shape of a sprocket wheel **223-1**, a vertically descending path **236** extending downward, an arc path along the outer shape of a sprocket wheel **223-2**, a lower traveling path **238** horizontally extending in a direction opposite to the flow direction of the production line, and an arc path along the outer shape of a sprocket wheel **222-4** leading to the vertically ascending path **232**, which paths connect to one another.

In the guiding plate, two guiding grooves for guiding the holding base **216** in left and right directions are formed. In the present embodiment, in the upper traveling path **234**, the interval between the two guiding grooves is gradually increased as the two guiding grooves are spaced from the cutting apparatus **206**. In the lower traveling path **238**, the interval between the two guiding grooves is gradually decreased as the two guiding grooves approach to the cutting apparatus **206**. In the vertically ascending path **232** and the vertically descending path **236**, the respective intervals between the guiding grooves are substantially constant.

Feeding rods **242** and **244** are disposed along the upper traveling path **234** and the lower traveling path **238**, respectively, in the left and right sides of the guiding plate. In the feeding rods **242** and **244**, a spiral feeding groove is formed. The pitch of the feeding groove is gradually increased along the flow direction of the production line. The pitch of the feeding groove on the side of the first circulating chain unit **218** is substantially equal to the pitch of the pin **228** in the circulating chain unit **218**, and that on the side of the second circulating chain unit **220** is substantially equal to the pitch of the pin **228** in the circulating chain unit **220**.

The holding base **216** for holding the adhesive tape **14** is held slidably in the left and right traverse directions by a support block **248**. In the present embodiment, two holding bases **216** are held on one support block **248**. One guiding rod extends from the holding base **216**, and enables the holding base **216** to slide left and right along a rail **254** on the support block **248**. The tip of the guiding rod is slidably fitted into the corresponding guiding groove in the state where the support block **248** is disposed on the guiding plate.

An inverted U-shaped bracket **258** is fixed to the lower surfaces of both ends of the support block **248**. A groove is formed in legs of the bracket **258**. The pins **228** on the chains **224** and **226** of the circulating chain units **218** and **220** are fitted into the groove. Accordingly, when the circulating chain units **218** and **220** are driven to circulate the chains **224** and **226**, the support block **248** moves with the chains accompanied by the circulation.

Furthermore, a roller bearing **262** is provided on left and right end surfaces of the support block **248**. The roller bearing **262** is fitted into the feeding grooves of the feeding rods **242** and **244** in the state where the support block **248** is disposed on the upper traveling path **234** or the lower traveling path **238** of the guiding plate. When the feeding rods **242** and **244** are rotated in the state where the roller bearing **262** is fitted into the feeding grooves of the feeding rods **242** and **244**, the support block **248** moves according to the rotational direction to the flow direction of the production line or the opposite direction thereto.

In such a configuration, many support blocks **248** are disposed on the guiding plate as shown in FIG. **11**. In the vertically ascending path **232** of the guiding plate, the pitch of the pin **228** in the first circulating chain unit **218** is narrow, and the interval between adjacent support blocks **248** in the anteroposterior direction in the circulating direction is narrow. The holding base **216** held there is in contact with or is extremely little spaced from its adjacent holding base **216** in the circulating direction. In the vertically descending path **236** of the guiding plate, the interval between the guiding grooves is largest, and adjacent holding bases **216** in left and right are largely spaced from each other.

In this state, the separating and conveying apparatus **214** is started. Then, the support block **248** located in the vertically ascending path **232** of the guiding plate ascends with movement of the pin **228** disposed in the chain **224** of the first circulating chain unit **218**, and travels the upper traveling path **234** of the guiding plate. Then, the pin **228** of the first circulating chain unit **218** fitted into the groove of the bracket **258** in the support block **248** starts descending, and is detached from the bracket **258**. At this timing, the roller bearings **262** disposed on the left and right ends of the support block **248** are inserted into the feeding grooves of the upper feeding rod **242**.

The feeding rod **242** is rotationally driven in a predetermined direction. Thereby, the support block **248** moves in the upper traveling path **234** in the flow direction of the production line. At this time, because the pitch of the feeding groove is gradually increased, the traveling speed of the support block **248** also increases and the interval between adjacent support blocks **248** in the anteroposterior direction increases. Since the interval between the two guiding grooves of the guiding plate is also gradually increased, two holding bases **216** move on the support block **248** in a direction in which the two holding bases are spaced from each other.

When the support block **248** reaches the tip of the feeding rod **242** (end on the side away from the cutting apparatus **206**), the roller bearing **262** of the support block **248** comes out from the feeding groove. At this time, the pin **228** in the chain **226** of the second circulating chain unit **220** is already fitted into the groove of the bracket **258** of the support block **248**, and the support block **248** is moved to the right and downwardly in FIG. **11** by the drive force of the second circulating chain unit **220**.

The operation of the support block **248** when traveling from the vertically descending path **236** via the lower traveling path **238** to the vertically ascending path **232** is the same as that when traveling from the vertically ascending path **232** via the upper traveling path **234** to the vertically descending path **236**. Accordingly, the description of the details thereof will be omitted, but it is easily understood that the intervals anterior and posterior to the support block **248** are narrowed in the lower traveling path **238** and the interval between the two holding bases **216** on the support block **248** is also narrowed.

The support block **248** is moved by the upper and lower feeding rods **242** and **244** of the first and second circulating chain units **218** and **220**. The timing to change from the circulating chain units **218** and **220** to the feeding rods **242** and **244** and the timing to convey from the feeding rods **242** and **244** to the circulating chain units **220** and **218** can be controlled by driving the first and second circulating chain units **218** and **220** and the upper and lower feeding rods **242** and **244** by a suitable transmission system, thereby separating and conveying the adhesive tape **14** with high precision.

The separating and conveying apparatus **214** is disposed adjacent to the cutting apparatus **206**. More specifically, in the state where the support block **248** is located in the lowest portion of the vertically ascending path **232** of the separating and conveying apparatus **214**, the separating and conveying

apparatus **214** is disposed such that the surface of the holding base **216** on the support block **248** is in contact with the outer surface of the anvil roll **210** of the cutting apparatus **206**. Thereby, the adhesive tape **14** punched out from the adhesive tape web **114**, held on the anvil roll **210**, and fed out is sequentially transferred onto the holding base **216**.

The anvil roll **210** vacuum adsorbs the adhesive tape **14** during a period from introduction of the adhesive tape **14** to transfer of the adhesive tape **14** onto the holding base **216**. Except this period, the anvil roll **210** air blows to facilitate transfer of the adhesive tape **14** onto the holding base **216**. In the present embodiment, many small holes are formed on the surface of the holding base **216** to generate a vacuum adsorption force. Various means for giving a vacuum adsorption force to the holding base **216** can be thought. Although not shown, for example, a vacuum port is formed on at least one end of the support block **248**. The vacuum port is brought into contact with a vacuum suction nozzle provided along the guiding plate **230** when the support block **248** is located in the vertically ascending path **232**. The vacuum port communicates with the inner space of the holding base **216** with a tube or the like. Thereby, a vacuum adsorption force generates only when the support block **248** is located on the vertically ascending path **232**, which enables the support block **248** to receive the adhesive tape **14** from the anvil roll **210** of the cutting apparatus **206**.

When the adhesive tape **14** is on the anvil roll **210**, the adhesive agent layer **12** is exposed, and the adhesive agent layer **12** contacts the holding base **216**. Accordingly, the surface of the holding base **216** is suitably subjected to a proper surface treatment in order to easily remove the adhesive tape **14** from the holding base **216** when the adhesive tape **14** is sent to the subsequent step.

Once the adhesive tapes **14** are placed on the holding bases **216**, the intervals between the adhesive tapes adjacent to each other in anterior, posterior, left, and right directions are increased in the upper traveling path **234** as understood from the operation of the separating and conveying apparatus **214** described above. The adhesive tapes **14** are fed as they are to a bonding apparatus **264** for bonding the adhesive tape **14** to the release sheet web **116**. FIG. **12** shows the state where the adhesive tapes **14** are conveyed in the upper traveling path **234**.

The bonding apparatus **264** has a vacuum adsorbing belt conveyor **266**. A belt **268** of the belt conveyor **266** is disposed so as to partially contact the surface of the holding base **216** located in the vertically descending portion **236** of the separating and conveying apparatus **214**. Accordingly, the belt **268** contacts the support **18** of the adhesive tape **14** held on the holding base **216**. Because the belt conveyor **266** is of a vacuum adsorption type, the adhesive tape **14** contacting the belt **268** is transferred from the holding base **216** to the belt **268**. At this time, the intervals between the adhesive tapes **14** adjacent to each other in anterior, posterior, left, and right directions are kept also on the belt **268**, and the adhesive agent layer **12** of the adhesive tape **14** is exposed downwardly.

The bonding apparatus **264** has a press roller **272** contacting a roller indicated by symbol **270** of the belt conveyor **266**. Between the press roller **272** and the roller **270**, the release sheet web **116** serving as the release sheet **16** is fed. Accordingly, the adhesive tape **14** fed between the press roller **272** and the roller **270** (feed position) is bonded to the upper surface of the release sheet web **116**, and is further conveyed downstream in this state with the release sheet web **116**.

The release sheet web **116**, although not shown, is held by a release sheet web feeding apparatus in a roll-like state, and is fed out from the apparatus. The surface of the release sheet web **116** to which the adhesive tape **14** is bonded is suitably subjected to a release treatment in advance.

The release sheet web **116** to which the adhesive tape **14** is bonded is then slit on the longitudinal center line in the slitter **274** as shown in (a) of FIG. **8**. In each of two release sheet webs **116***a* and **116***b* obtained by slitting, a row of adhesive tapes **14** is aligned, and predetermined spaces are formed between adjacent adhesive tapes **14** in the anteroposterior direction.

Thereafter, in a portion indicated by symbol **276**, the two release sheet webs **116***a* and **116***b* slit are pulled in opposite directions to form a predetermined interval between the two release sheet webs **116***a* and **116***b*. The interval is formed in consideration of the installation space or the like of a bending apparatus **278**, a heat sealing apparatus **280**, and a temporary attaching apparatus **282** in the post stages. Namely, the interval between the two release sheet webs **116***a* and **116***b* is properly determined according to the installation positions and types of these apparatuses in the post stages. In some cases, it is thought that an increase of the interval is unnecessary.

The slit release sheet webs **116***a* and **116***b* each are continuously fed to the bending apparatus **278** via the buffer apparatus **284**. In the present embodiment, sealing is of a box motion type using heat sealing performed by the heat sealing apparatus **280** and a temporary attaching sealer operating mechanism using the temporary attaching apparatus **282**.

As shown in FIG. **13**, the bending apparatus **278** includes a base **286** having a smooth surface on which the release sheet web **116***a* or **116***b* is placed; a disk presser roller **288** contacting the surface of the base **286**, having a horizontal rotational axis, and disposed in the feeding direction of the release sheet web **116***a* or **116***b*; and a pair of press rollers **290** disposed downstream of the presser roller **288**, having a vertical rotational axis, and disposed intersecting perpendicular to the feeding direction of the release sheet web **116***a* or **116***b*. The press rollers **290** contact each other and rotate. The presser roller **288** contacts a portion corresponding to substantially the longitudinal center line of the release sheet web **116***a* or **116***b* conveyed on the base **286**. The presser roller **288** assists the release sheet web **116***a* or **116***b* and the adhesive tape **14** bonded thereto to be folded in two at the contacting point. The release sheet web **116***a* or **116***b* and the adhesive tape **14** bonded thereto are completely folded in two by the press roller **290**.

In the bending apparatus **278**, a method for raising both sides of the release sheet web **116***a* or **116***b* is employed. By raising both sides thereof, the rotational amount of each side of the release sheet web **116***a* or **116***b* is only 90°, and the amount of deviation can be reduced.

The position in which the presser roller **288** contacts the release sheet web **116***a* or **116***b* is not on the longitudinal center line of the release sheet web **116***a* or **116***b*, but is suitably a position slightly shifted from the longitudinal center line. Thereby, the edge **20** of the first portion **22** and the edge **20** of the second portion **24** of the release sheet **16** in the final product pressure-sensitive adhesive tape package **10** are slightly deviated from each other as shown in FIG. **1**. The deviated portion of the edge **20** provides an effect of easily holding the release sheet **16** with fingers to easily separate the first portion **22** from the second portion **24**.

The release sheet webs **116***a* and **116***b* folded in two by the bending apparatus **278** are fed to the heat sealing apparatus **280**. The heat sealing apparatus **280** having a known configuration can be used. Although the details are not shown in the diagram, in the present embodiment, a box motion type heat sealing apparatus including a pair of heating heads that can

contact each other and be spaced from each other is used. As known, a projection is formed in a portion of the heating head corresponding to the position contacting the release sheet web **116***a* or **116***b* to heat seal the web. In the present embodiment, the heating head is configured so as to heat seal the portion corresponding to four final products.

In the present embodiment, the hatched portions in FIG. **14** are heat sealed. The space surrounded by three sealed portions **38**, **40**, and **42** and the bent portions of the release sheet web **116***a* or **116***b* defines the accommodating space for the adhesive tape **14**. It is noted that in the present embodiment, two sealed portions are formed between adjacent adhesive tapes **14** as indicated by symbols **40** and **42**. Of course, the sealed portions **40** and **42** can be integrated into one. However, when two heat-sealed portions are formed between adjacent adhesive tapes **14** as shown in FIG. **14**, the widths of the sealed portions **40** and **42** in the final products can be kept constant even if the cutting position is slightly deviated. Namely, even if the cutting position is changed as shown with long dashed double-short dashed lines indicated by symbols A, B, and C in FIG. **14**, this does not affect the widths of the sealed portions **40** and **42**. Thus, if the widths of the sealed portions **40** and **42** are constant, an effect of allowing a constant force applied to the sealed portions **40** and **42** during opening of the package can be attained.

The sealed portion **38** formed parallel to the longitudinal direction of the release sheet web **116***a* or **116***b* is largely spaced from a free edge **120** of the release sheet web **116***a* or **116***b* in the longitudinal direction. Thereby, in the final product pressure-sensitive adhesive tape package **10**, the outer portion from the sealed portion **38** functions as a holding portion **44**. The holding portion is easy to hold with fingers, and opening the package is easy. As described above, the edges **20** of the first portion **22** and the second portion **24** in the release sheet **16** are slightly displaced to facilitate separation of the layered portion of the release sheet **16** that forms the holding portion **44**, and the package is easier to open.

The sealed portions **38**, **40**, and **42** are linear, and approximately right-angled corners **46** and **48** are formed in their cross portions. Furthermore, as described above, the sealed portions **40** and **42** are also slightly spaced from the corresponding edges in the final product **10** as shown in FIG. **1**, and therefore the corners **46** and **48** are also spaced from the edges **20**, **34**, and **36**, respectively. The corners **46** and **48** are spaced from the edges **20**, **34**, and **36** to attain an effect of concentrating a force on this portion and much facilitating opening the package.

As the heat seal, the so-called easy peel techniques is used. The easy peel means easy releasabilty as described in the Patent Map for Technical Fields, General 21 "Adhesion," p. 335, available from the Japan Patent Office website (www.j-po.go.jp/shiryou/s_sonota/map/ippan21/4/4-3-1.htm), and refers to containers and packages sealed by heat sealing to provide easy releasing upon opening. Specifically, examples of easy peel include various types such as a cohesive failure type in which the adhesive layer between the first portion **22** and second portion **24** of the release sheet **16** itself is broken to be released off, an interlayer releasing type in which adhesive strength between the adhesive layer and the first portion **22** or second portion **24** is small, and the first portion **22** or the second portion **24** is released off from the adhesive layer at the time of opening, and an interlayer releasing type using an easy-releasable resin such as EVA, but are not particularly limited thereto; in the case where a sheet material in which a polyethylene layer is disposed on the surface is used as the release sheet **16**, those with a two-layered structure composed of a resin layer containing a high density polyethylene as a principal component and an easy peel resin layer prepared by adding a resin causing the cohesive failure to a low density polyethylene, for example, may be used as an easy peel adhesive layer.

In the present embodiment, the heat sealing apparatus **280** is of a box motion type. Namely, the heat sealing apparatus **280** is configured to continuously move the release sheet web **116***a* or **116***b*, sandwich the release sheet web **116***a* or **116***b* by a pair of heating heads, and feed the release sheet web to the next step when heat seal is completed. However, a continuous heat sealing apparatus including a pair of heat sealing rollers contacting each other and rotating can also be used.

The release sheet web **116***a* or **116***b* heat sealed by the heat sealing apparatus **280** is further continuously fed downstream, and fed to the temporary attaching apparatus **282**. In the present embodiment, four temporary attaching apparatuses **282** are provided for each of the release sheet webs **116***a* and **116***b*, which enable temporary attachment of four adhesive tapes **14** and each of the release sheet webs **116***a* and **116***b* at the same time. The temporary attaching apparatus **282** basically has the same configuration as that of a known box motion type heat sealing apparatus, and includes a pair of heating heads that can contact and depart from each other. In the present embodiment, the heating head is configured to form dotted temporary attach portions **50**, **52**, and **54** as shown in FIG. **1**.

In the temporary attaching apparatus **282** having such a configuration, when the release sheet web **116***a* or **116***b* continuously flowed is flowed to a predetermined position, the pair of heating heads approach each other in synchronization with the flow rate of the release sheet web to sandwich the release sheet web **116***a* or **116***b*. Then, heat is applied to the surface of the release sheet web **116***a* or **116***b* for a constant time. Thereby, a thermoplastic material disposed in the innermost layer of the release sheet web **116***a* or **116***b* is molten, and adhered to the support **18** of the adhesive tape **14**. Thereby, the extending portion **30** of the adhesive tape **14** is temporarily attached to the release sheet web.

The temporary attachment and heat sealing can be performed at the same time by providing a projection for forming a temporary attach portion in the heating head of the heat sealing apparatus **280** above. It can be easily understood that instead of the box motion type temporary attaching apparatus, the temporary attachment can be performed using a continuous temporary attaching apparatus including a pair of heating rollers contacting each other and rotating.

After temporary attachment is performed, the release sheet webs **116***a* and **116***b* are cut by a cutting apparatus indicated by symbol **292** in FIG. **8**, and the final product pressure-sensitive adhesive tape package **10** shown in FIG. **1** is completed. After that, the pressure-sensitive adhesive tape package **10** is subjected to check of the product, outer packaging, and the like.

As above, the suitable embodiment according to the present invention has been described in detail, and needless to say, the present invention will not be limited to the embodiment above.

For example, in the above embodiment, after the adhesive tape web **114** is cut, two rows of adhesive tapes **14** are fed. Alternatively, a single row of adhesive tapes may be fed. In this case, in the separating and conveying apparatus **214**, only one holding base **216** may be provided on the support block **248**. The holding base does not move in the left and right traverse directions, and may be configured to increase the interval only anteroposterior to the support block **248**. The release sheet web **116** is not slit, and needless to say, the slitter **274** is unnecessary.

It is also thought that the adhesive tape web **114** is cut into three, and three rows of adhesive tapes **14** are fed. In this case, in the separating and conveying apparatus **214**, three holding bases **216** are provided for one support block **248**, and three guiding grooves are provided to guide the three holding bases **216**. When four or more rows of adhesive tapes **14** are fed, the separating and conveying apparatus **214** is similarly modified.

The adhesive tape **14** is not limited to an adhesive tape obtained by cutting the adhesive tape web **114** fed out from the roll, and may be an adhesive tape obtained by cutting a short web, or the so-called sheet-fed adhesive tape base material **115** as shown in FIG. **15**.

Furthermore, in the above embodiment, after the liner **104** is removed from the adhesive tape web **114** fed from the adhesive tape roll **100**, the adhesive tape **14** having a size of the product is cut out. As schematically shown in FIG. **16**, a method for half-cutting the adhesive tape web **114** so as to leave the adhesive tape **14**, which is the product, on the liner **104** before removal of the liner **104** is also thought. In this case, the adhesive tape **14** can be conveyed by the liner **104**. By half-cutting the adhesive tape **14** at a predetermined interval in advance, and feeding the adhesive tape **14** at a predetermined feed position **312** while the liner **104** is being removed, the adhesive tape **14** is sequentially bonded at the feed position **312** at the predetermined interval to the release sheet web **116** flowed at the same speed. Accordingly, in this case, the above separating and conveying apparatus **214** is unnecessary.

When the adhesive tape **14** is half-cut without providing an interval between the adhesive tapes **14**, the adhesive tape **14** can also be sequentially bonded to the release sheet web **116** at the predetermined interval by properly setting the feeding rate of the adhesive tape **14** or the timing to feed the adhesive tape to the feed position **312** and the feeding rate of the release sheet web **116** or the timing to feed and stop the release sheet web **116**.

REFERENCE SIGNS LIST

10 . . . pressure-sensitive adhesive tape package, **12** . . . adhesive agent layer, **14** . . . pressure-sensitive adhesive tape, **16** . . . release sheet, **18** . . . support, **38**, **40**, **42** . . . sealed portion, **50**, **52**, **54** . . . temporary attach portion, **55** . . . means for reducing an adhesive force, **100** . . . adhesive tape roll, **104** . . . liner, **114** . . . adhesive tape web (adhesive tape base material), **115** . . . adhesive tape base material, **116** . . . release sheet web (release sheet base material), **116***a*, **116***b* . . . slit release sheet web, **200** . . . adhesive tape web feeding apparatus, **202** . . . tension adjusting apparatus, **204** . . . liner releasing apparatus, **206** . . . cutting apparatus, **208** . . . die cut roll, **210** . . . anvil roll, **212** . . . feed position, **214** . . . separating and conveying apparatus, **216** . . . holding base, **218** . . . first circulating chain unit, **220** . . . second circulating chain unit, **224**, **226** . . . chain, **228** . . . pin, **232** . . . vertically ascending path, **234** . . . upper traveling path, **236** . . . vertically descending path, **238** . . . lower traveling path, **242**, **244** . . . feeding rod, **248** . . . support block, **254** . . . rail, **258** . . . bracket, **262** . . . roller bearing, **264** . . . bonding apparatus, **266** . . . belt conveyor, **268** . . . belt, **270** . . . roller, **272** . . . press roller, **274** . . . slitter, **278** . . . bending apparatus, **280** . . . heat sealing apparatus, **282** . . . temporary attaching apparatus, **284** . . . buffer apparatus, **286** . . . base, **288** . . . presser roller, **290** . . . press roller, **292** . . . cutting apparatus, **312** . . . feed position

The invention claimed is:

1. A method for producing a pressure-sensitive adhesive tape package, the pressure-sensitive adhesive tape package accommodating a pressure-sensitive adhesive tape having a support and an adhesive agent layer provided on one surface of the support, the pressure-sensitive adhesive tape package comprising a release sheet to which the adhesive agent layer of the adhesive tape is releasably attached, the method comprising:

a step of feeding a release sheet base material serving as the release sheet to a predetermined feed position;

a step of sequentially feeding a plurality of adhesive tapes in a row to the release sheet base material at the feed position, and bonding the adhesive tapes to the release sheet base material such that predetermined spaces are formed between the adhesive tapes adjacent in anterior and posterior directions of the feeding direction;

a step of folding the release sheet base material with the adhesive tape in two;

a step of sealing a predetermined portion of the release sheet base material to form the two-folded release sheet base material including a plurality of accommodating spaces each of which accommodates one adhesive tape;

a step of temporarily attaching a part of each adhesive tape to the release sheet base material; and

a step of cutting the release sheet base material to form the pressure-sensitive adhesive tape package;

wherein the step of bonding the adhesive tape to the release sheet base material comprises:

a substep of cutting an adhesive tape base material serving as the adhesive tape to form a row of adhesive tapes; and

a substep of separating adjacent adhesive tapes from each other, and feeding the adhesive tapes to the feed position while intervals between the adjacent adhesive tapes are increasing.

2. The method for producing a pressure-sensitive adhesive tape package according to claim **1**, wherein the sealing is heat sealing.

3. The method for producing a pressure-sensitive adhesive tape package according to claim **2**, wherein the temporary attachment is performed by thermal bonding.

4. The method for producing a pressure-sensitive adhesive tape package according to claim **2**, wherein in the step of sealing a predetermined portion of the release sheet base material, two sealed portions are formed at a constant interval between adjacent accommodating spaces, and

in the step of cutting the release sheet base material, cutting is performed between the two sealed portions.

5. The method for producing a pressure-sensitive adhesive tape package according to claim **1**, wherein the temporary attachment is performed by thermal bonding.

6. The method for producing a pressure-sensitive adhesive tape package according to claim **1**, wherein in the step of sealing a predetermined portion of the release sheet base material, two sealed portions are formed at a constant interval between adjacent accommodating spaces, and

in the step of cutting the release sheet base material, cutting is performed between the two sealed portions.

7. A method for producing a pressure-sensitive adhesive tape package, the pressure-sensitive adhesive tape package accommodating a pressure-sensitive adhesive tape having a support and an adhesive agent layer provided on one surface of the support, the pressure-sensitive adhesive tape package comprising a release sheet to which the adhesive agent layer of the adhesive tape is releasably attached, the method comprising:

a step of feeding a release sheet base material serving as the release sheet to a predetermined feed position;

a step of sequentially feeding a plurality of rows of a plurality of adhesive tapes to the release sheet base mate-

rial at the feed position, and bonding the adhesive tapes to the release sheet base material such that predetermined spaces are formed between the adhesive tapes adjacent in anterior, posterior, left, and right directions of the feeding direction;

a step of slitting the release sheet base material along a longitudinal direction thereof to form a plurality of release sheet base materials, a row of adhesive tapes being bonded to each of the release sheet base materials;

a step of folding the slit release sheet base material with the adhesive tape in two;

a step of sealing a predetermined portion of the release sheet base material to form the two-folded release sheet base material including a plurality of accommodating spaces each of which accommodates one adhesive tape;

a step of temporarily attaching the release sheet base material to a part of each adhesive tape; and

a step of cutting the release sheet base material to form the pressure-sensitive adhesive tape package;

wherein the step of bonding the adhesive tape to the release sheet base material comprises:

a substep of cutting an adhesive tape base material serving as the adhesive tape to form a plurality of rows of adhesive tapes; and

a substep of separating the adhesive tapes adjacent in anterior, posterior, left, and right directions from each other and feeding the adhesive tapes to the feed position while intervals between the adjacent adhesive tapes are increasing.

8. The method for producing a pressure-sensitive adhesive tape package according to claim **7**, wherein the sealing is heat sealing.

9. The method for producing a pressure-sensitive adhesive tape package according to claim **8**, wherein the temporary attachment is performed by thermal bonding.

10. The method for producing a pressure-sensitive adhesive tape package according to claim **8**, wherein in the step of sealing a predetermined portion of the release sheet base material, two sealed portions are formed at a constant interval between adjacent accommodating spaces, and

in the step of cutting the release sheet base material, cutting is performed between the two sealed portions.

11. The method for producing a pressure-sensitive adhesive tape package according to claim **7**, wherein the temporary attachment is performed by thermal bonding.

12. The method for producing a pressure-sensitive adhesive tape package according to claim **7**, wherein in the step of sealing a predetermined portion of the release sheet base material, two sealed portions are formed at a constant interval between adjacent accommodating spaces, and

in the step of cutting the release sheet base material, cutting is performed between the two sealed portions.

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